

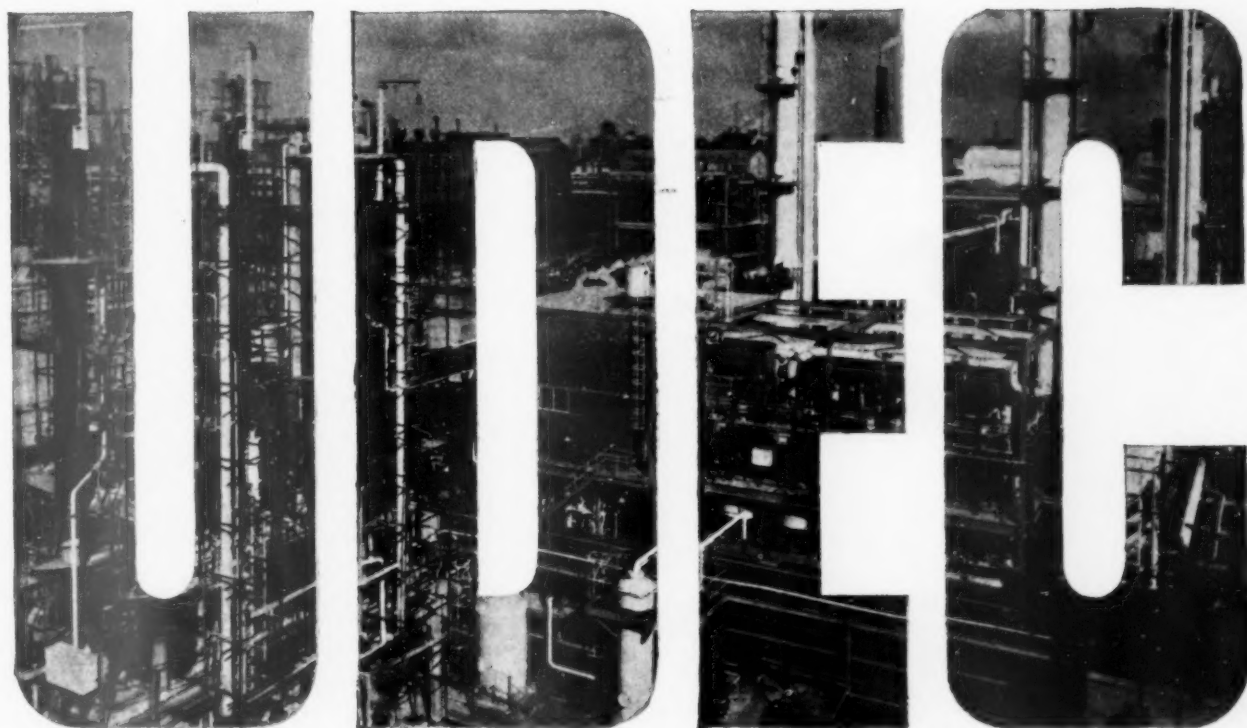
MODERN REFRIGERATION

AND AIR CONTROL

Vol. 64 No. 763

OCTOBER, 1961

Price 2s. 6d. monthly



refrigeration specialists to the industries of the world

The I.C.I. acrylonitrile plant at Billingham

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Abbey Works · Park Royal · London · N.W.10

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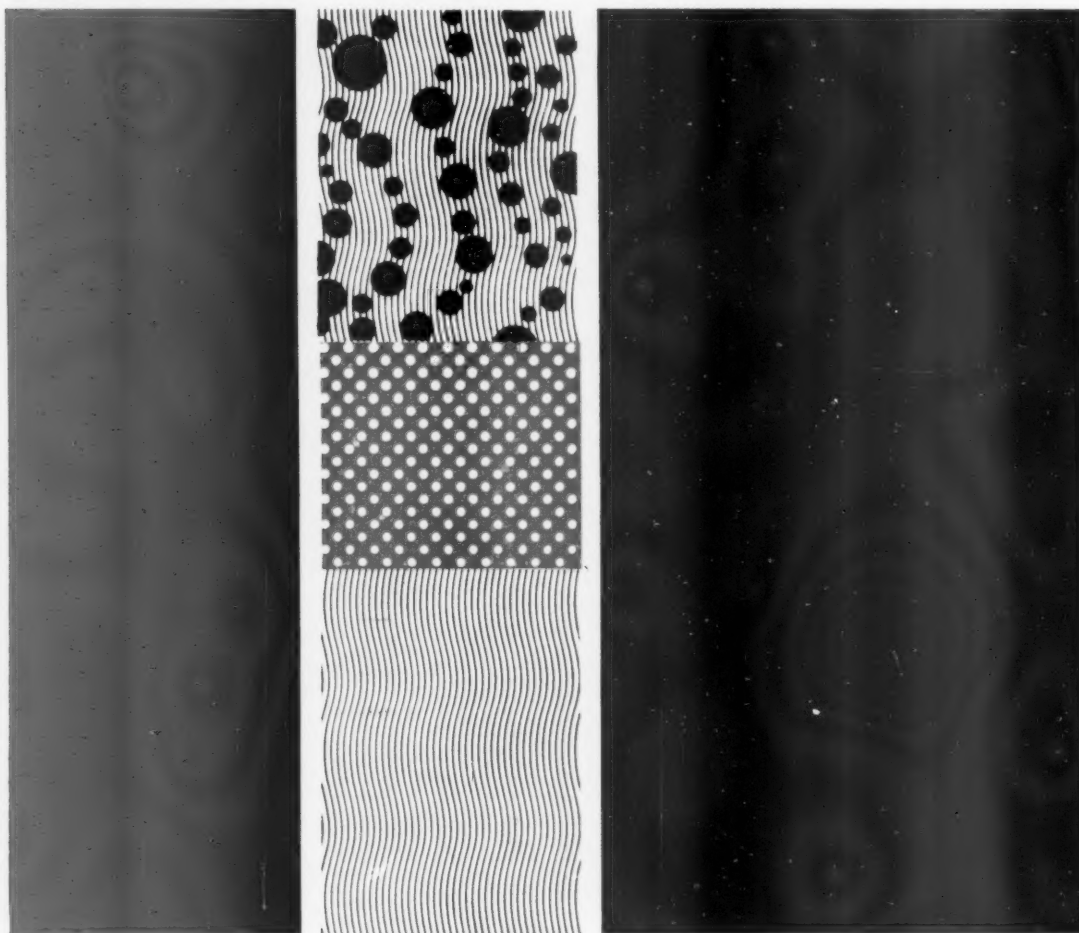
Molecular sieve desiccants for refrigerator systems

Molecular sieves developed by Union Carbide* are the complete answer to the many problems involved in drying refrigerants and refrigerator systems. If you manufacture, or use refrigerating plant, look at these advantages:

- High water capacity even at elevated temperatures. (So the cartridge can be fitted on the liquid side).
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- Capacity to take up acid eliminates acid corrosion.
- No capacity loss from oil adsorption—i.e. oil mist from compressor.

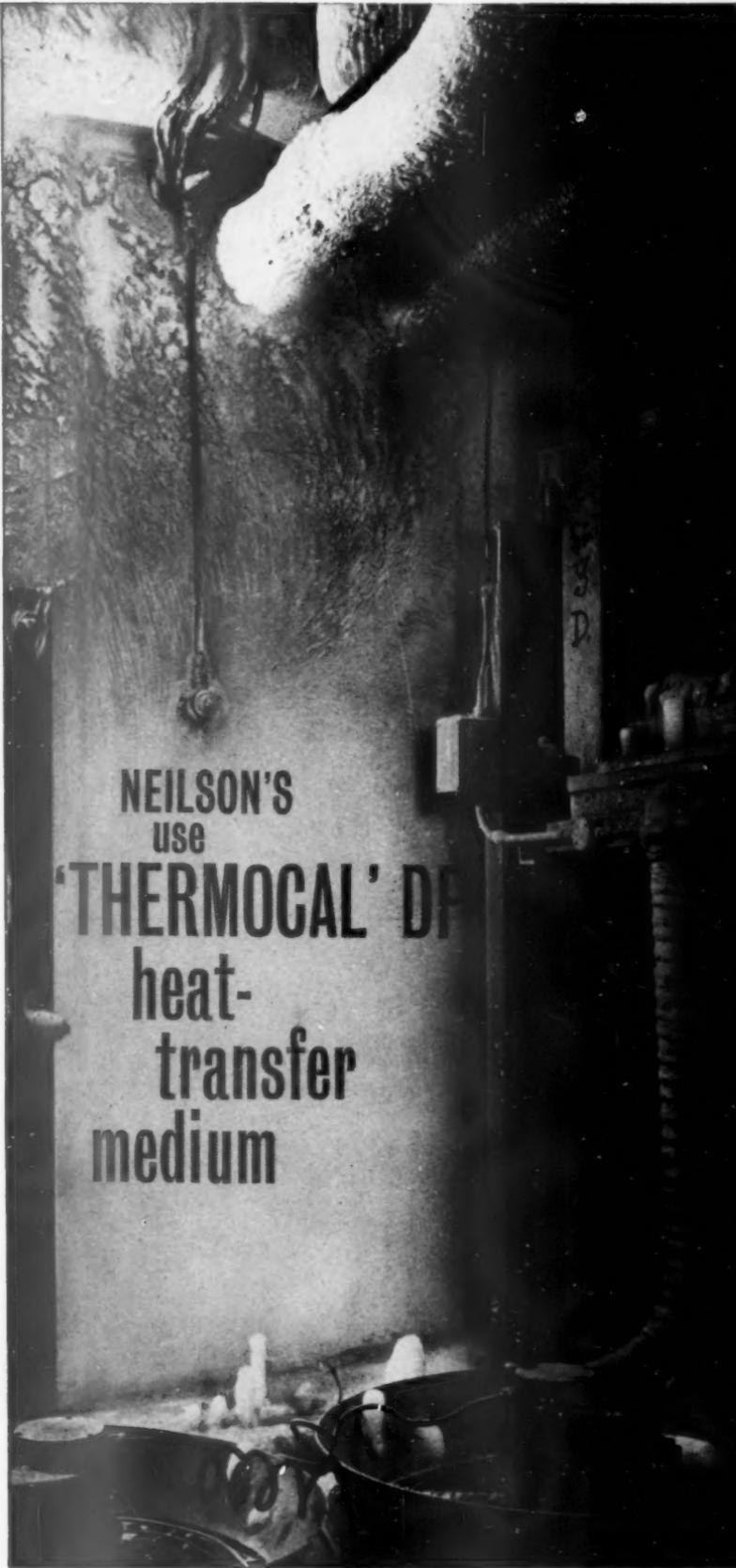


We shall be pleased to send comprehensive literature or further information on request.



*The term UNION CARBIDE is a trade mark of UNION CARBIDE CORPORATION
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use
'THERMOCAL' DF
heat-
transfer
medium

Because 'Thermocal' DF is the least corrosive of all glycol-based heat-transfer media, Neilson's (Ice Cream and Frozen Foods) Ltd. use it in all automatic defrosting plant at their factories and depots. And they'll continue to specify 'Thermocal' DF because they regard the reduction it brings in plant maintenance and stoppages as vital to the successful operation of closed-circuit refrigeration units.

Aqueous solutions of

'THERMOCAL' DF

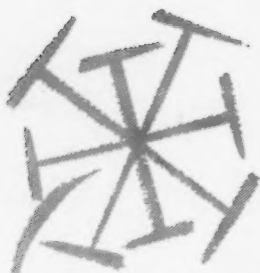
freeze well below 0°C and can be used as defrosting fluids, industrial coolants, and heat-transfer media between -40°C and 100°C. These solutions have outstanding resistance to corrosion, high specific heats and thermal conductivities, long-term stability over a wide range of temperature, low coefficients of expansion, and low flammability.

If you'd like to know more about 'Thermocal' DF, please write. For a technical visit, please get in touch with your nearest I.C.I. Sales Office.

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October 1961 MODERN REFRIGERATION

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including Purchase Tax
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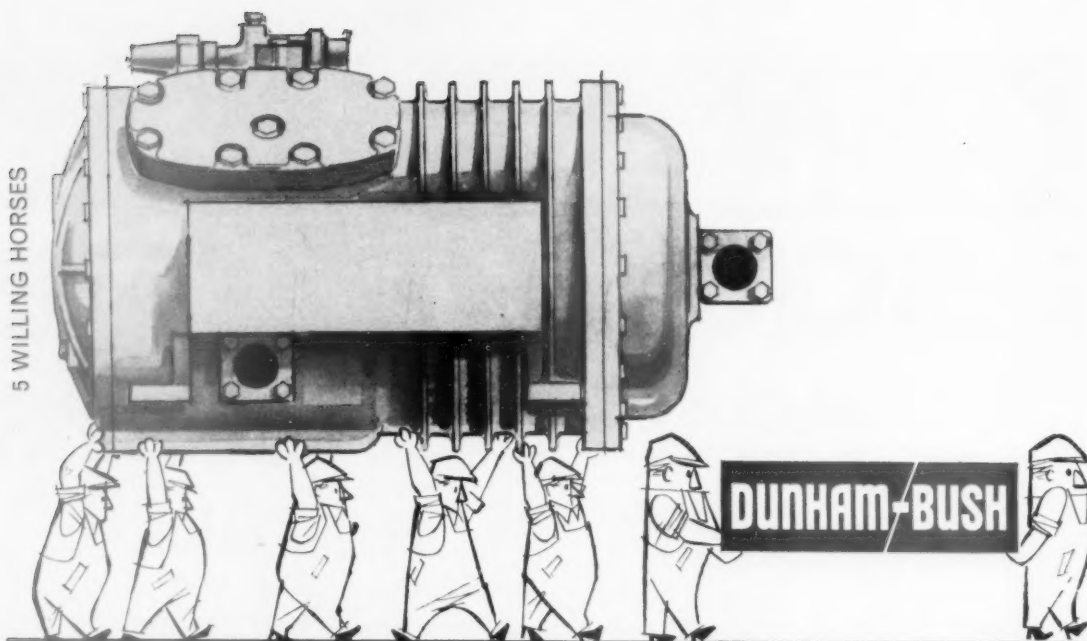
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Lec REFRIGERATION (B)

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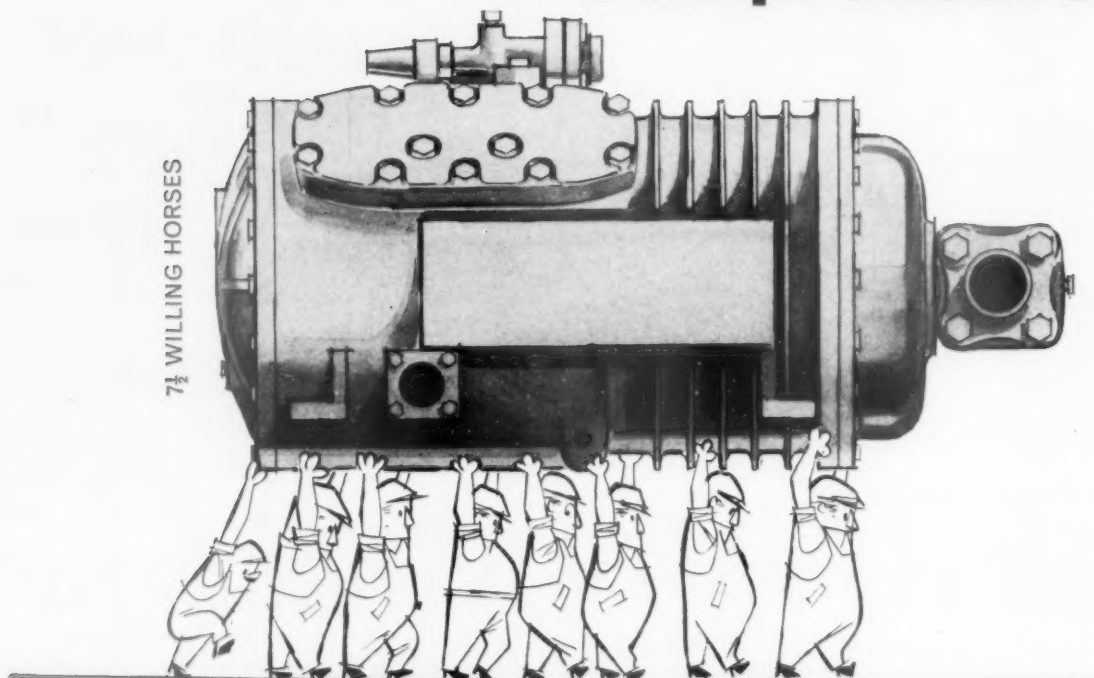
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7½ WILLING HORSES



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Compact design, easy access for maintenance, simple, low-cost installation and long, trouble-free service with the minimum of attention —these features make Worthington-Simpson pumps the ideal choice for brine and water circulation and other refrigeration duties.

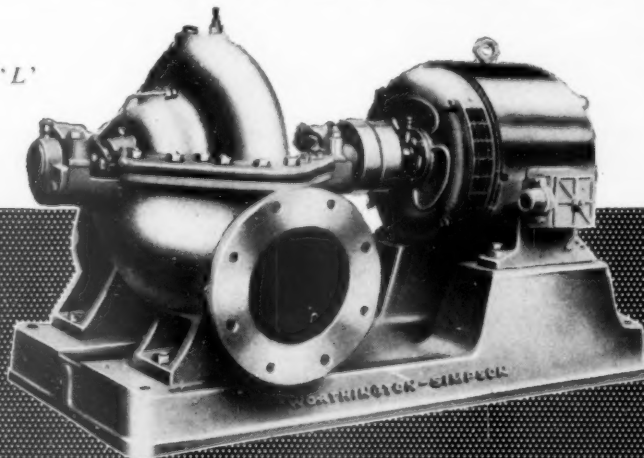
W/S refrigeration pumps include:

Single and two-stage volute pumps of split case construction.

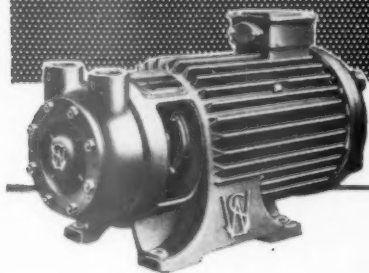
'Monobloc' centrifugal pumps of compact design, providing easy installation and perfect alignment and handling a wide variety of chemicals.

'Vortex' self-priming centrifugal pumps—providing the easiest and most economical method of small capacity pumping to high heads.

Type 'L'

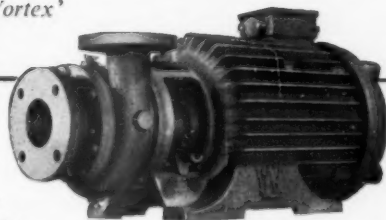


'Vortex'



'Monobloc'

Patent Number 858979

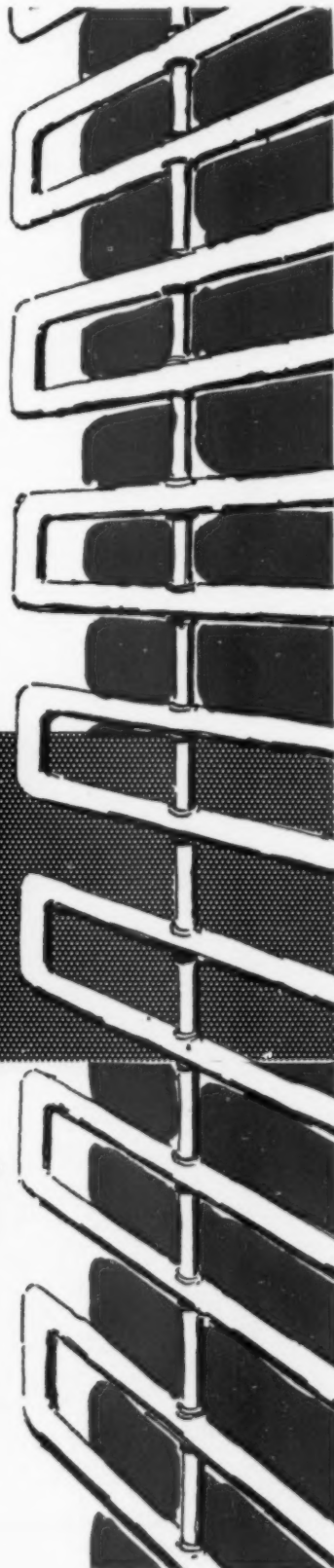


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Worthington - Simpson Ltd

PUMPS • COMPRESSORS • HEAT EXCHANGE EQUIPMENT

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... and custom made Prototypes for industry

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Special Frozen Food Displays—odd lengths, shapes, angles ; odd size Cold Rooms and Cabinets ; Milk Coolers ready for equipment ; Stacking equipment for Frozen Food in storage and transport ; special kinds of insulated Display or Sales Vehicles—in fact anything that proves a nuisance in modern line production, but which manufacturers wish to supply to valued clients, can be made by

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**YORKSHIRE
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**LIGHT GAUGE COPPER AND
COPPER-ALLOY TUBES and
"YORKSHIRE" CAPILLARY FITTINGS**

for refrigeration and air-conditioning plant

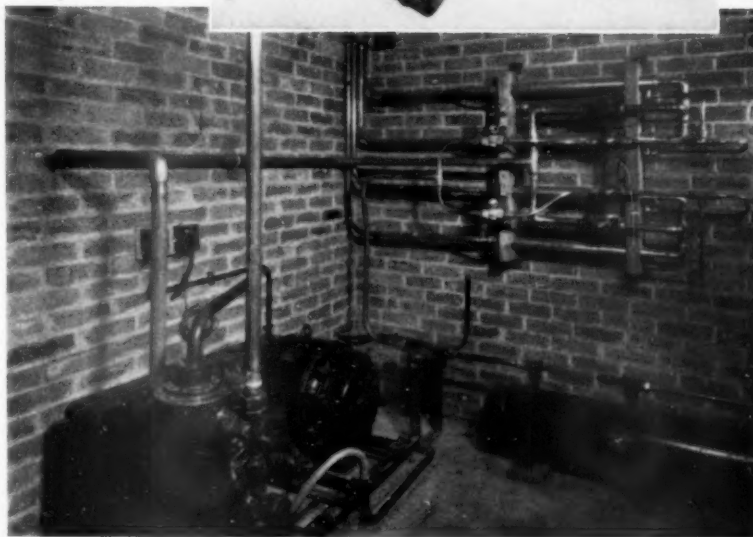
"Yorkshire" Capillary Fittings are especially suitable for joining copper and copper-alloy tubes operating at low temperatures in refrigeration and other services.

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The appearance of a complete ring of solder at the mouth of the fitting is visual proof of a sound and reliable joint.



*Pipework arrangement—
incorporating "Yorkshire"
Fittings—in compressor
room at the Birtley Factory
of Messrs. Kraft Foods Ltd.
(installation by Messrs. L.
Sterne & Co. Ltd.)*



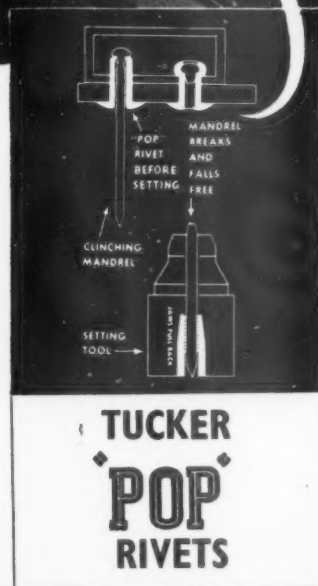
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Illustrated: Clothing locker installation by Steel Equipment Co. Ltd., West Bromwich, Staffs.



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Styled with a flair,
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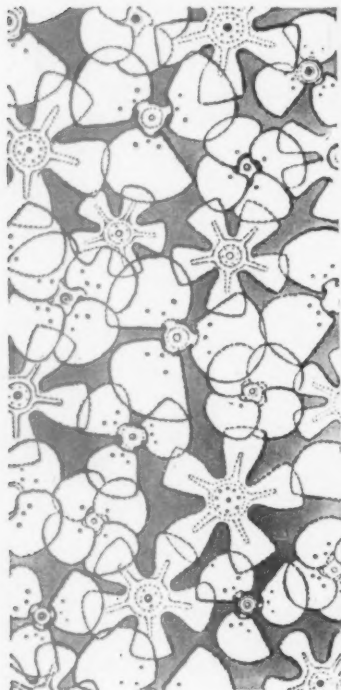
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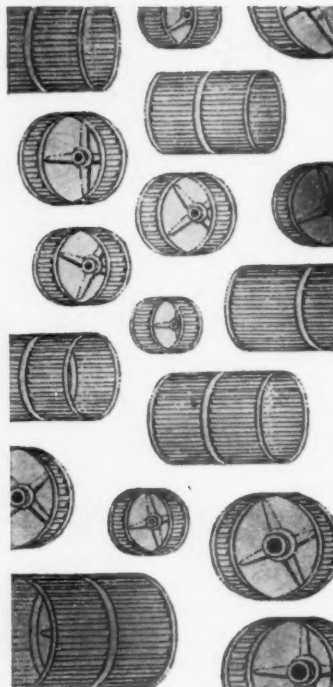
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AIROTORS? YES, SIR

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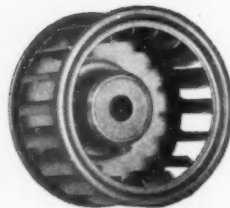
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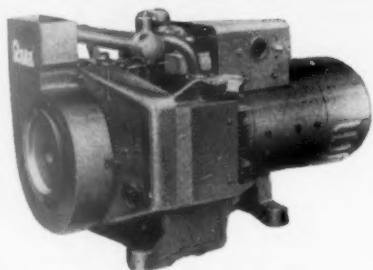
THE GENERATING SET ENGINEERED FOR REFRIGERATED VEHICLES

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Exclusive to Onan — overcomes cooling problems in confined space. Cooling air is drawn through and over the generator and engine and exhausted through an outside duct.

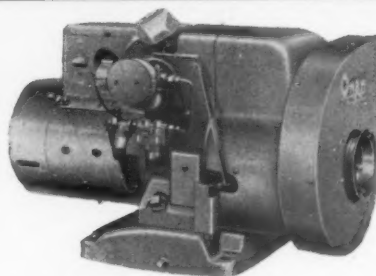
Built by Messrs. Blox Services Ltd., this Refrigerated Truck is operated by Flying Goose Ltd., for transporting frozen poultry. The electrical power, for the refrigeration equipment, is supplied by an Onan Model 305 CCK. After exhaustive tests, leading Manufacturers of Refrigeration Equipment recommend Onan Generators exclusively.



ONAN 5 CCK GENERATOR WITH VACU-FLO COOLING

gives 5 k.w. of packaged power and will handle refrigeration units of up to 3 h.p. Model 305 CCK meets the requirements of units up to 2 h.p.

LOOK AT THE WEIGHTS—5 k.w. Model ONLY 375 lbs., 3½ k.w. Model ONLY 314 lbs.



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Most models available ex stock. Our After Sales Service is unmatched by any other suppliers.

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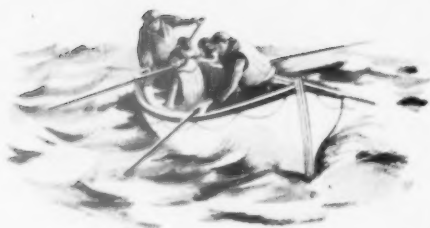
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continues with the growth of new and exciting markets—expansion is a commonplace word at Searles, for as you know we manufacture ‘direct expansion cooling coils’ together with ‘water coils’ and ‘steam coils’. We also specialise in the production of coils for room air conditioners, including window type units. Both condensers and evaporators are carefully engineered to provide efficient performance in any circumstances. This calls for the robust construction and versatility of design for which Searle-Bush coils are renowned. The extensive range of fin/tube combinations permits coils as unusual as those calling for 17 fins per inch, or split banks, as well as evaporators having progressive fin pitch. Why not write for literature?

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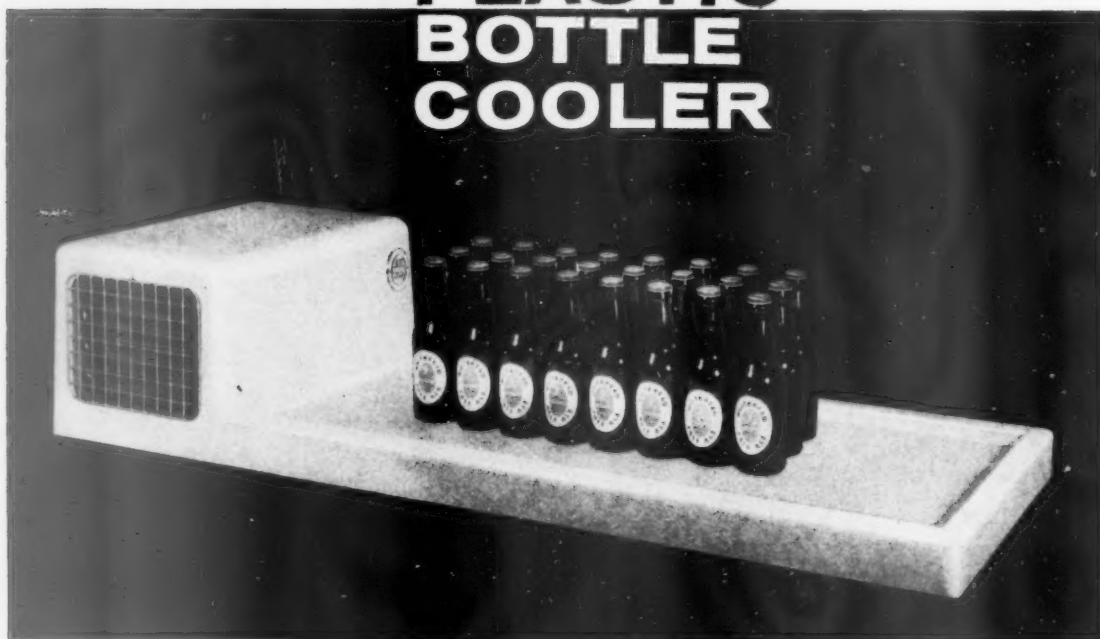


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MOULDED PLASTIC BOTTLE COOLER



This attractive Bottle Cooler is of one piece streamlined glass fibre construction which gives a smooth eye-catching finish, all joints and sharp corners being eliminated in the design so that it can be easily kept clean simply by wiping with a damp cloth. The unit is completely mobile being both light in weight and self-contained, requiring only connection to the electricity supply to bring it into operation. Sizes available 5'x2' (144 half pint bottles) and 6'x2' (194 half pint bottles). Condensing unit is a one-fifth horsepower Kelvinator wound for 230 volts, 50 cycle, single-phase supply.

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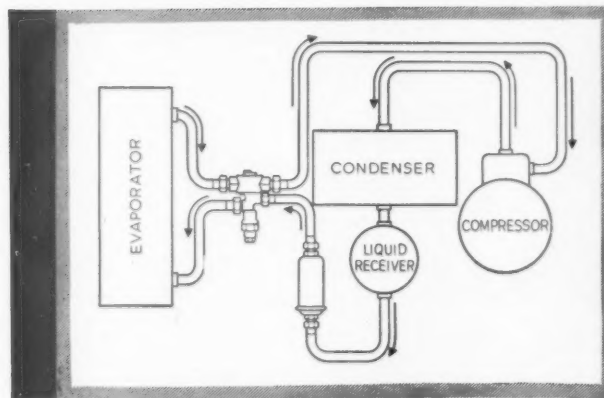


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Type RD Thermostatic Expansion Valve

FOR FREON 12 AND FREON 22

- * Self-contained—no capillary or phial
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*Typical Vapour Compression Refrigeration Circuit
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The ideal unit for:

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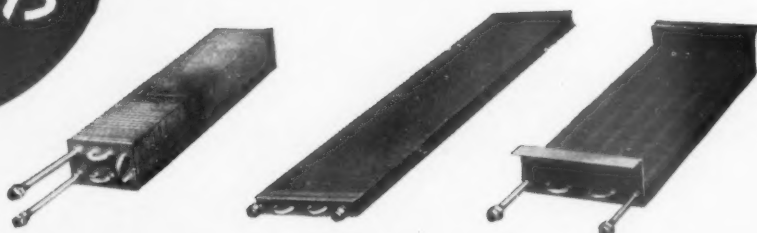
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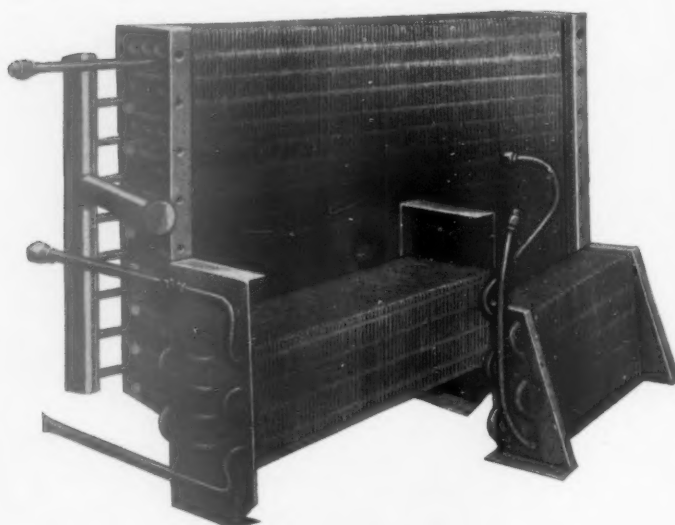


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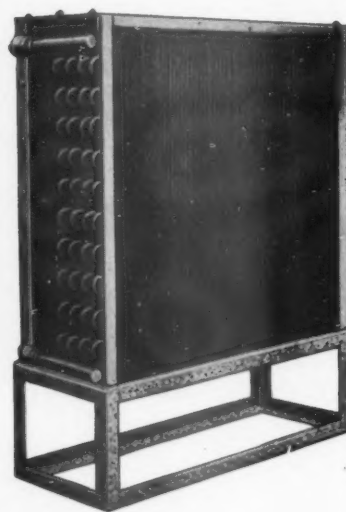


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Completely automatic hot gas defrost

Entirely self-contained with hermetically
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Easily installed in any cold room.

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Suitable for overall wall thickness

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PLETELY PACKAGED AUTO-DEFROST
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COMPANY

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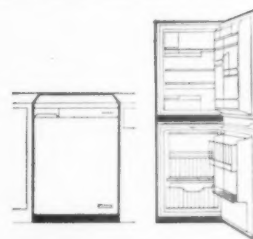
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MAKERS OF THE WORLD'S QUIETEST ROOM AIR CONDITIONER

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Kenwood's best-sellers in refrigeration —
FREEZER AND REFRIGERATOR TO MATCH!



BIG CAPACITY- LOW PRICE!



For the first time ever . . . complete refrigeration in two separate matched units . . . at really down-to-earth prices! The Kenwood HF 42A meets the growing demand for a *real* home deep-freezer—with 4.2 cu. ft. of genuine sub-zero degree storage. And the matching Kenwood HR 52A Refrigerator packs in a full 5.2 cu. ft. of storage for all weekly needs. Superbly designed, expertly planned to make the most of their big capacity, these two are your best sellers in refrigeration!

Side by side under one double-width table top (optional extra, main illustration) . . . one atop the other (right) . . . under a built-in counter or separately . . . left or right hand door opening . . . the Kenwood pair fit handsomely into any shape or size kitchen!

RETAIL PRICES	
FREEZER HF 42A	\$60.14.10 + \$11.14.2 PT
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Every woman wants a

WPS 212

Kenwood Norge 'Never-D-Frost' Refrigerator/Freezers —the most glamorous refrigerators in Britain!

With these two magnificent models, Kenwood almost makes kitchen larders obsolete! Each has a separate, zero-degree genuine deep freeze compartment—as big in itself as many ordinary refrigerators! And the larder-sized main compartments are entirely self-defrosting. Handsomely styled with brilliantly planned and fitted interiors, these two meet the public trend towards real home deep-freezes and bigger-capacity refrigerators combined!



KF 13

nearly 3½ cubic feet Deep Freeze capacity (over 1 cwt)

13.3 cubic feet capacity

20.9 square feet shelf area

RECOMMENDED SELLING PRICE £189.0.0

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18.3 square feet shelf area

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A Company of The Kenwood Group

Kenwood kitchen!



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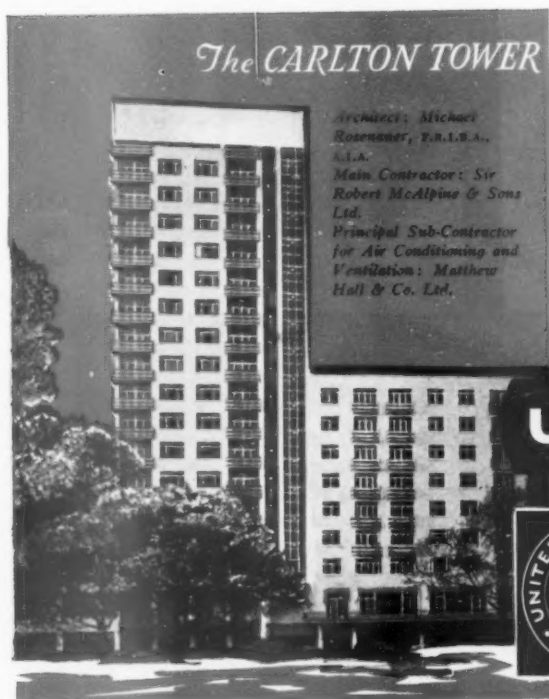
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Tailored for **V.I.P.s.**



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A.I.A.
Main Contractor: Sir
Robert McAlpine & Sons
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Principal Sub-Contractor
for Air Conditioning and
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Hall & Co. Ltd.*

for **VERY IMPORTANT PLACES**

For the air conditioning and installation at The Carlton Tower, United Air Coil were selected to supply the Heat Transfer Surfaces. Similar equipment has also been supplied for heating and cooling installations for many other equally imposing projects.

for **VERY IMPORTANT PEOPLE**

For heating in Multiple Stores Unit, Heaters Manufactured by Air Coil Products have been installed. "Coolaire" Unit Coolers also provide pleasant conditions for shoppers in a Regent Street Store.

UNITED AIR COIL LTD.



AIR COIL PRODUCTS LTD.

UNITED AIR COIL specialise in the manufacture of Heat Transfer Surfaces to customers' specific requirements. **COOLING COILS** for use with chilled water, brine and direct expansion refrigerants; also coils for solvent recovery. **HEATING COILS** for all systems using either steam or hot water.

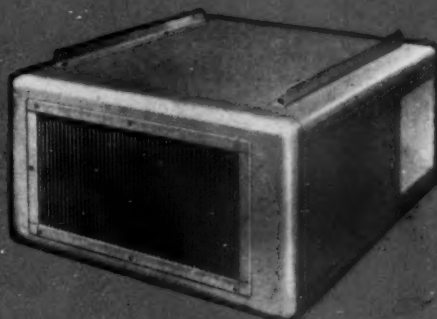
AIR COIL PRODUCTS are Designers and Manufacturers of standard and special Forced Convectors, Unit Coolers, Air-cooled Condensers and all types of Air-handling Units.

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FOR EVERY APPLICATION**

Coolaire

SUSPENDED

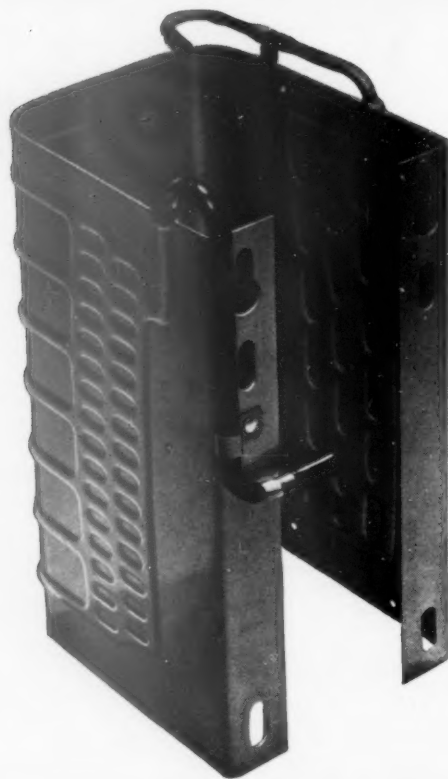
ROOM COOLER



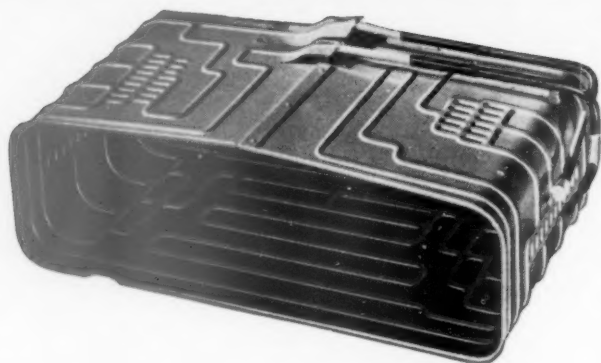
These neat and compact units provide an even air circulation and controlled temperature. They are ideal for stores, restaurants or any public building where inexpensive air-conditioning equipment is desirable for the promotion of customer goodwill.

UNITED AIR COIL LTD., 14 TRINITY STREET, LONDON, S.E.1

Marston Evaporator Units

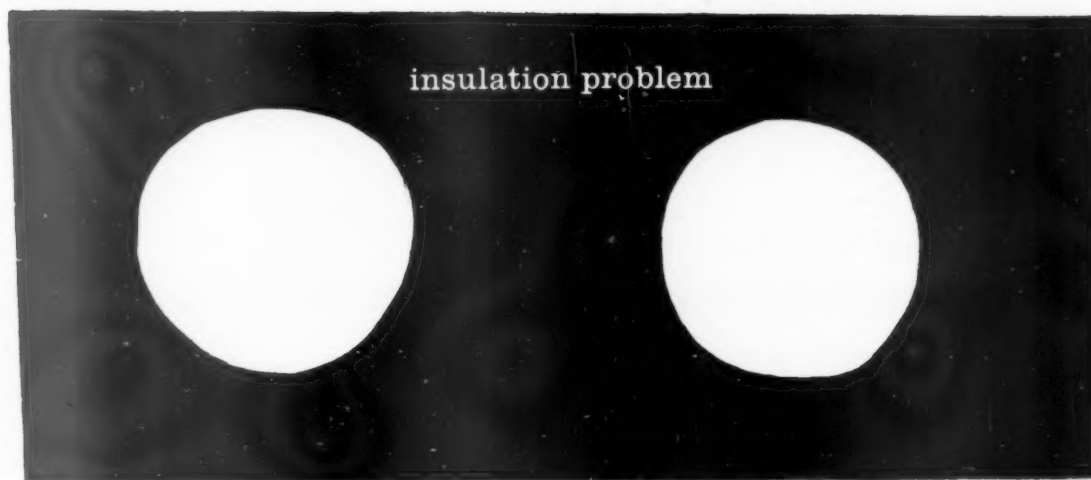
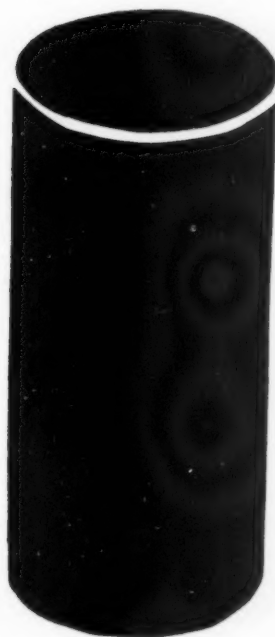


Light alloy roll-welded evaporator units offer many advantages: superior performance, light weight, attractive appearance, flexibility of design, competitive prices. A production line specially equipped for the fabrication of these units is operated by Marstons, specialists in heat transfer for sixty years. Why not discuss your design and production problems with them?



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a subsidiary of Imperial Chemical Industries Ltd.
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MAR. 29a



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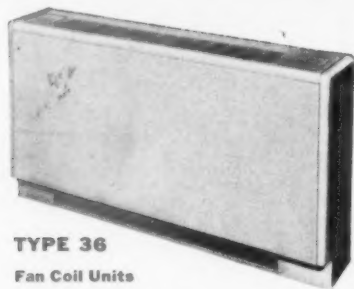


Cape Insulation & Asbestos Products Ltd. (a Subsidiary of The Cape Asbestos Co. Ltd.) 114 & 116 Park Street, London, W.1. GR0 6022

TA 110F

Some of the specialised

FOR AIR CONDITIONING AND

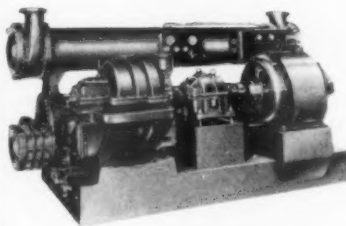


TYPE 36

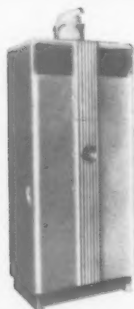
Fan Coil Units

Low and high pressure.

17M Centrifugal Refrigerating Units Also 19C Hermetic Centrifugals



Will give long efficient service with only minimum maintenance and will supply chilled water for all types of air conditioning systems, or will chill brine or condense vapours over a wide range of temperature levels. They give precise, automatic control at desired levels. Refrigerating capacities 100-4,000 tons.



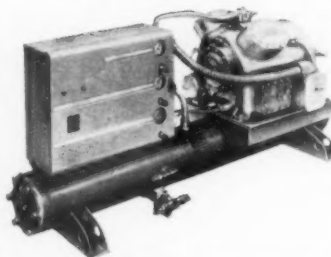
TYPE 50

Laboratory Air Conditioners

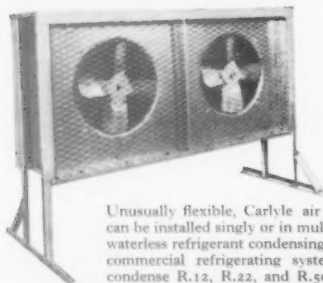
Give precision control of temperature and humidity. They ensure year round control of temperature and humidity to within $\pm 1^\circ\text{F}$ and $\pm 1\frac{1}{2}\%$ R.H. These Carlyle units are the result of years of specialized experience in all phases of atmosphere control involving application of air conditioning and refrigeration to industrial plants and processes. Capacities from 20,000 to 80,000 Btu/hr.

TYPE 5 & 6

Open and Hermetic Compressors



Unequalled for performance flexibility. Feature automatic un-loaded starting. Automatic capacity control. Positive pressure lubrication. Carlyle Open and Semi-hermetic reciprocating compressors with built in capacity control are designed for speeds up to 1,750 r.p.m. with belt or direct drive. Available to match loads up to 100 tons.



TYPE 9

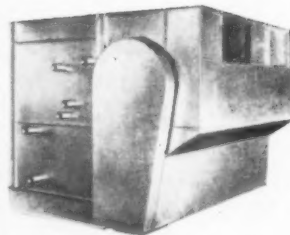
Air Cooled Condensers

Unusually flexible, Carlyle air cooled condenser units can be installed singly or in multiples or provide remote, waterless refrigerant condensing for air conditioning and commercial refrigerating systems of all sizes. They condense R.12, R.22, and R.500 with equal efficiency. The use of non-corrosive materials makes them ideal for outdoor installation.

TYPE 9

Evaporative Condensers

Used in place of water cooled condensers, the Carlyle Evaporative Condenser can affect material savings in operating cost of as much as 95% in water supply requirements, and up to 15% in power costs. Water pumping costs are also drastically reduced. Carlyle Evaporative Condensers can be used for food freezing and storage, product and chemical processing and similar industries where refrigeration plays a vital part. Capacities from 10 to 250 tons.



CARLYLE AIR CONDITIONING & REFRIGERATION LTD

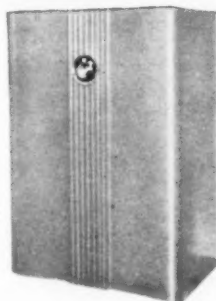
CARLYLE products

REFRIGERATION APPLICATIONS

TYPE 50

Self-contained Air Conditioners

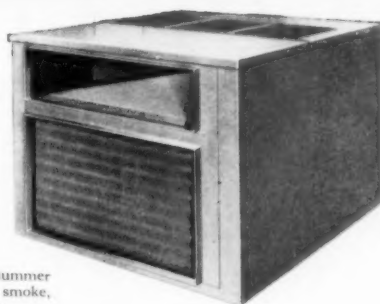
Ideal for use singly or in multiples, Housed in an attractive cabinet, they utilise serviceable hermetic refrigerating compressors with air or water cooled condensers. Capacities of these units are in various sizes and range from 2 to 15 tons.



TYPE 64

Heat Pumps

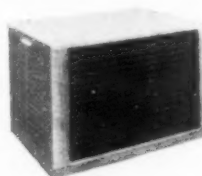
Winter heating, summer cooling without smoke, fuel storage or fuss.



TYPE 38

Split Packaged Air Conditioners

Fan Coil Unit, Air cooled
Condensing Unit.



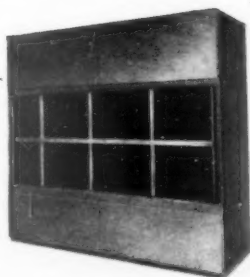
Room Air Conditioners

In several sizes from 9,000 to
20,080 Btu/hr. capacity.

TYPE 41

Large Self-Contained Air Conditioners

Available in capacities from 15 to 45 tons. Provide all the air-conditioning functions, heating, cooling, dehumidifying, filtering and circulating. For use with ducted systems only, this unitary equipment enables installations totalling hundreds of tons to be effected quickly and economically.



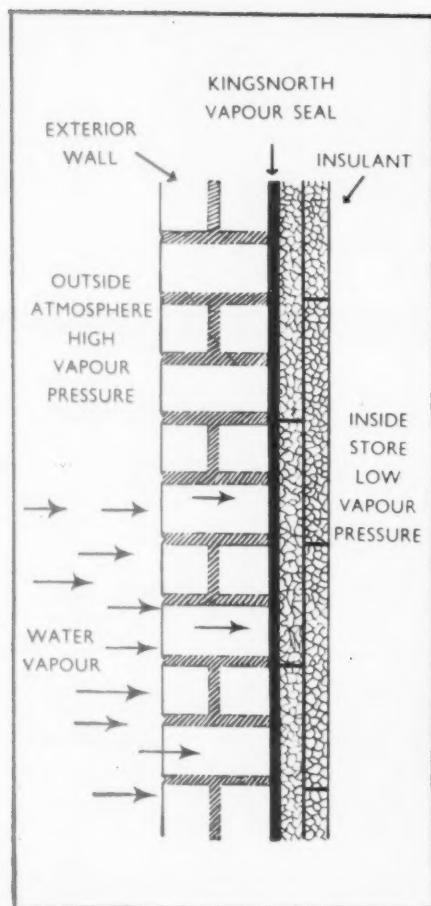
To meet requirements
of temperature
and humidity...
specify **CARLYLE**



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Whitehall 5356

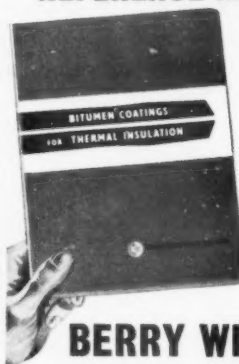
KINGSNORTH Vapour Seal No. 25

- * Reduces vapour transmission
- * Protects insulation
- * Increases thermal efficiency



Specially developed by Berry Wiggins after long research into the problems of providing an efficient impermeable vapour seal. Kingsnorth No. 25 increases thermal efficiency and minimises deterioration from condensation and freezing. In one year in this country approximately 33 gallons of vapour will penetrate a chamber 25 ft. x 40 ft. x 15 ft., operating at 5° F. By sealing with Kingsnorth Vapour Seal No. 25 penetration can be reduced to approximately $\frac{3}{4}$ of a gallon.

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REFERENCE MANUAL BY BERRY WIGGINS**



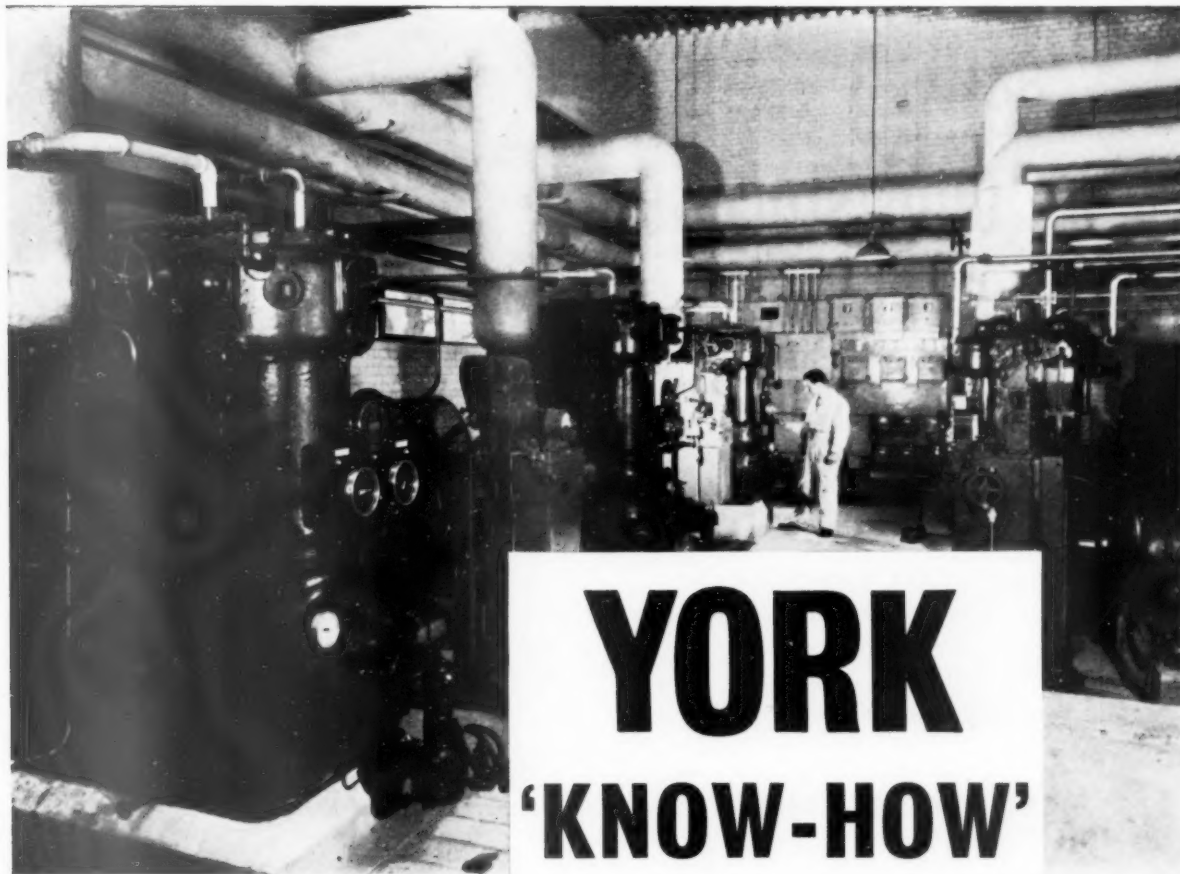
Contains information, specifications and covering capacity tables on Bitumen Vapour Seals, Adhesives, Waterproofing and Gas Sealing Coatings for use in low temperature insulation. Indispensable to those concerned with the building and maintenance of cold stores.

BERRY WIGGINS & CO. LTD.

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TELEPHONE: CHANCERY 4499 (20 LINES)





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for the worlds most modern frozen-chicken factory-

For the giant Aldershot factory of the Buxted Chicken Co. Ltd., York freezing and cold storage equipment has been installed—throughout.

York 'know-how' first ensures that body heat is removed speedily, safely. The birds pass into rotating drums—which immerse them in water chilled with flake ice from York automatic icemakers.

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... a brush-applied emulsion that gives a resilient stable and durable film of low water vapour permeability on the "hot" side of insulation in cold storage construction.

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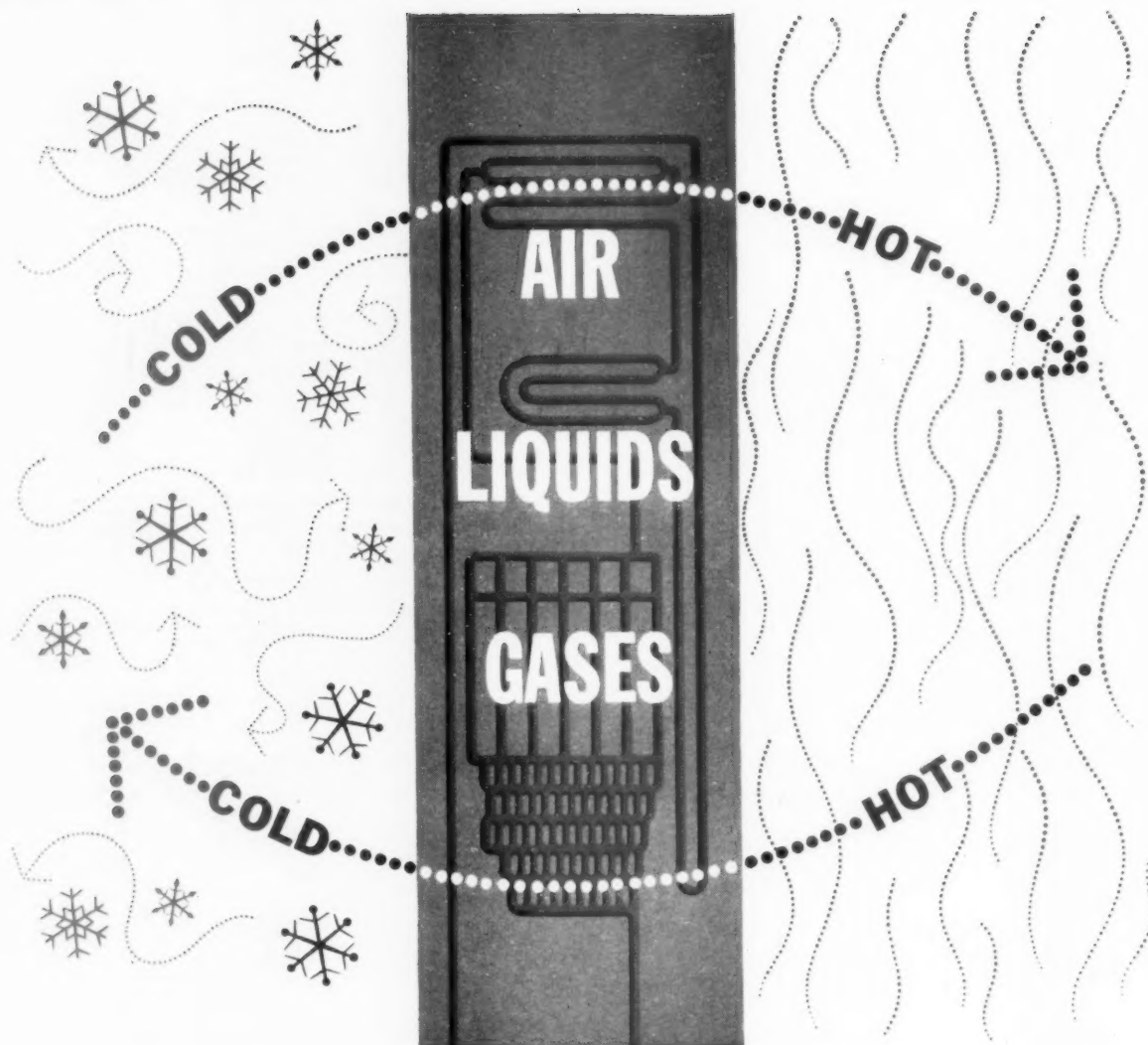
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both
had them
solved

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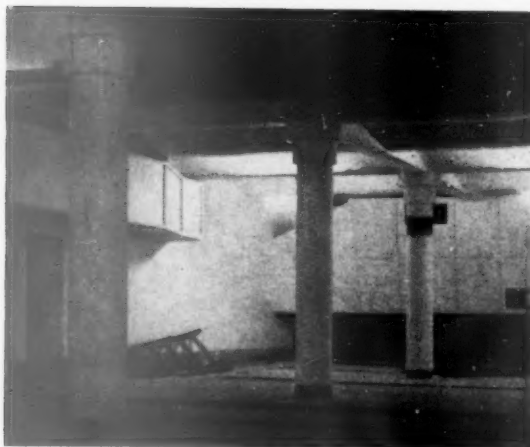
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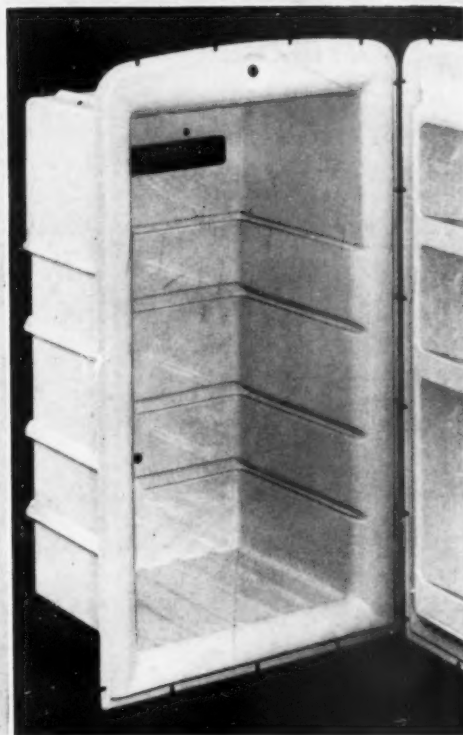
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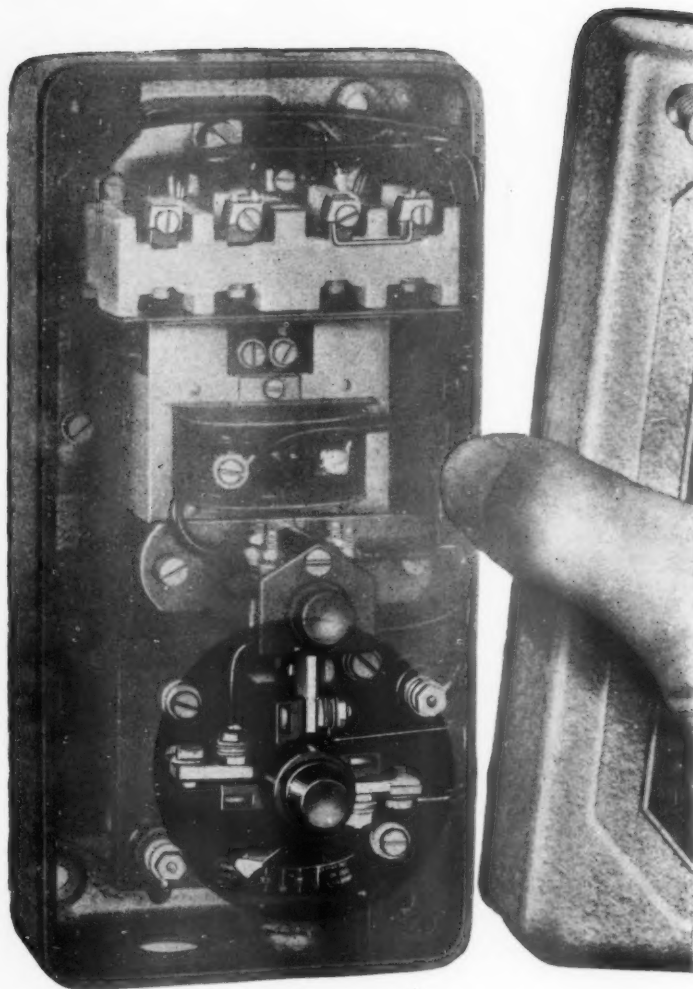
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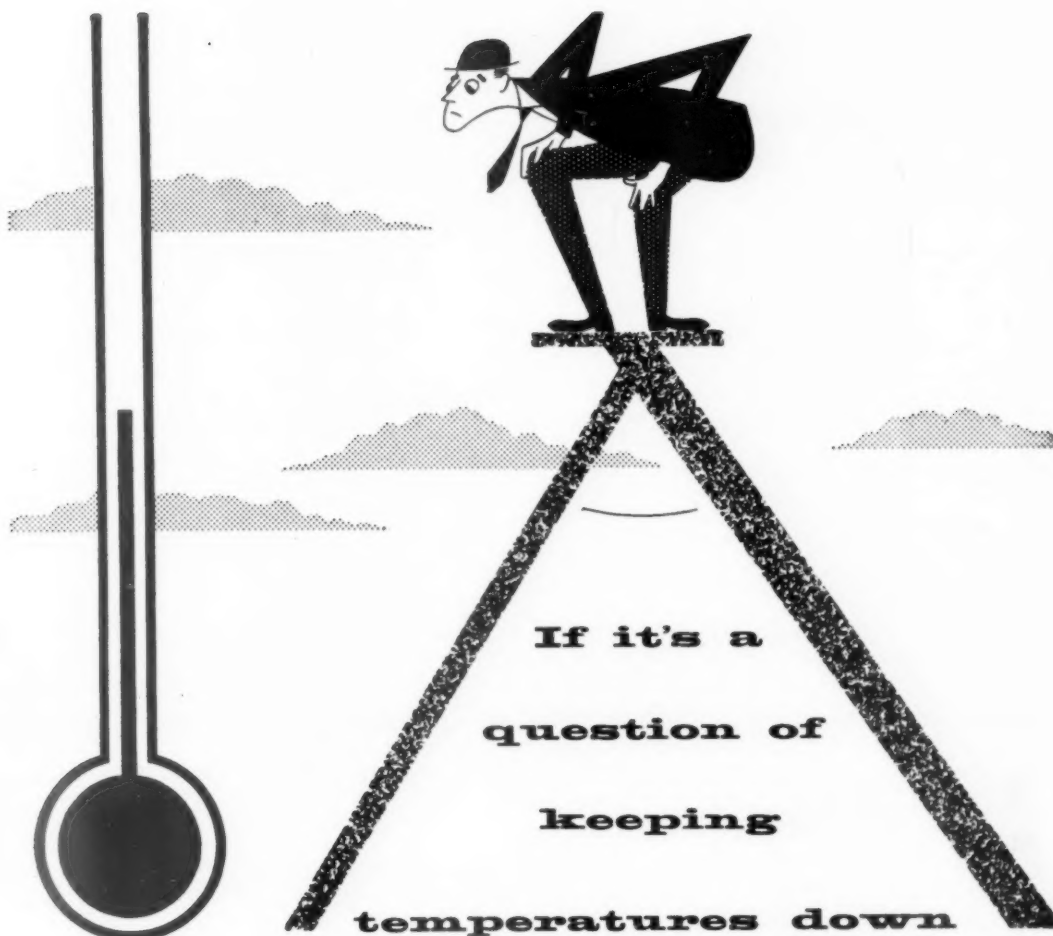
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45

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Aero Pipe & Glass Co. Ltd

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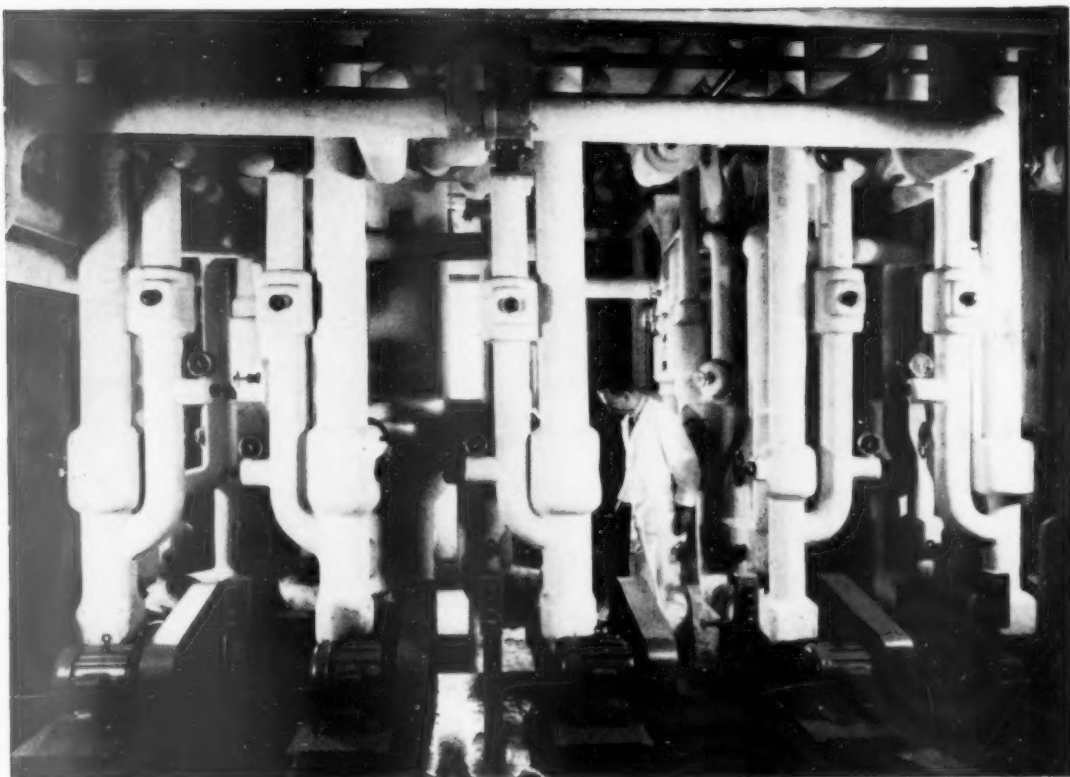
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Interior view of Cold Store.

BRANCHES AT LONDON, GLASGOW, NEWCASTLE AND SOUTHAMPTON



ONAZOTE *Pipe Sections by the mile*

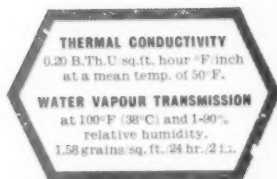
helps to make

Lyons Maid

ice cream

In this extremely advanced and well-equipped plant at Bridge Park, Greenford, Onazote pipe sections were exclusively used for insulating the thousands of feet of refrigeration pipe lines to the freezers and hardening tunnels, and also for insulating the ammonia vessels in the Engine Room. All the chilled water lines throughout the factory were also insulated with Onazote.

Onazote was chosen for its unrivalled insulation efficiency and low water vapour transmission. So valuable was the latter in this particular case that it was possible to put the ammonia lines into operation before the final vapour seal was applied.



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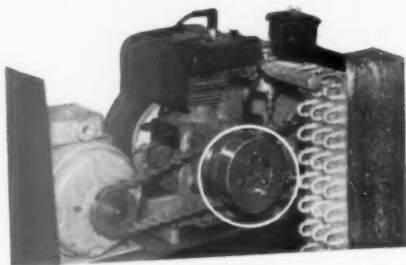
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for mobile
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with **BROADBENT**
centrifugal
CLUTCHES

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process drastically
cuts insulating time

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Owing to the ever increasing production costs, the publishers of **MODERN REFRIGERATION** regret that they are compelled to make a slight increase in their charges for Classified Advertisements. As from the **November** issue all headings will be **9d.** per word; **Minimum 15/-**.

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JORDAN, Kelvinator Distributor has vacancy for qualified Service Engineer to service domestic cabinets, conservators, beverage coolers and control spare parts store. Successful applicant will sign a term contract with Fare out and return paid and paid leave end of contract. Applications with details of qualifications, experience, salaries received to date, whether married or single, to be sent to Factory Service Manager, Kelvinator Ltd., New Chester Road, Bromborough, Cheshire. 375

REFRIGERATION ENGINEER AND FITTER, conversant with ice cream processing and freezing plant, used to plant reconditioning. Wages £18 per week offered to right man. London area, Apply Box 361.

REFRIGERATION SERVICE ENGINEER of top class required by newly appointed Distributors of **MARCO** products. Sound experience in the trade an absolute necessity. Top salary to successful applicant. Apply Company Secretary, Foresight Refrigeration Limited, Beacon House, Hampton Street, Birmingham, 19 Telephone Central 2016. 365

VACANCY for qualified and experienced service engineer for commercial refrigeration in the East Midlands. A well appointed flat is available, suitable for married couple, without children. Write to Fred Hawkes (Refrigeration) Ltd., Polar Works, Park Road, Rushden, Northants. 176

VACANCY for a qualified, experienced service engineer in the East Midlands, with progressive firm. A well appointed modern house is available for the successful applicant. 42-hour week plus overtime. Write to Fred Hawkes (Refrigeration) Ltd., 3/5 Park Road, Rushden, Northants. 218

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MISCELLANEOUS

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STERNE TECUMSEH SEALED SYSTEM 5/7 cubic ft. £11 11s. each. Wilde & Clayton (Refrigeration Ltd.), 1 Hindsley Place, Forest Hill, S.E.23. Phone: FOR. 8851. 309

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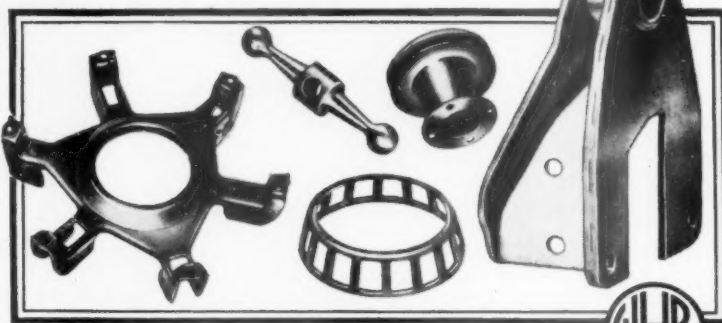
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REVIEW
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Established 1898

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Editorial

The "Household" Market NFCSIT's Golden Jubilee I.I.R. in Cambridge

● A rather more optimistic tone was detectable in the domestic refrigerator market in July when deliveries of British-made domestic refrigerators to the home market totalled 108,130. This is an increase of 10.3 per cent. on July, 1960—the first month in which the impact of the new hire purchase restrictions was fully felt. Total deliveries for the first seven months of this year reflect the downward trend in demand caused by fluctuating Government policy over the past months. Deliveries from January-July inclusive—a total of 642,677—fell by 14.5 per cent. over the same period last year—a total of 751,408.

● The drop in export demand in July was substantial, however, deliveries to overseas markets being only 8,397, a decrease of 24.2 per cent. compared with July, 1960. This fall again reflects the uncertainties faced by the industry at home at the present time.

● The golden jubilee luncheon of The National Federation of Cold Storage and Ice Trades, held at the Criterion, London, saw a happy ceremony performed in the presentation to its president, Mr. Eugene Ruddin, C.B.E., of a gold watch to mark his completion of a long term in the chair—13 years, in fact. Mr. Ruddin has steered the N.F.C.S.I.T. very successfully through difficult waters since the immediate post-war period when the burning topic has been the utilization of the wartime-built Government cold stores. In recent years, there has been heavy pressure exerted to place some of these on the open market and it has been due, in no small measure, to Mr. Ruddin's stout defence of the established cold storage industry that this trade's worst fears have not yet materialized.

● A successful series of meetings of four commissions of The International Institute of Refrigeration were held in Cambridge last month. It may not be generally known that the I.I.R. (or I.I.F. to the non-English-speaking world) holds massive four-yearly congresses in various parts of the world (the next will be in Munich in 1963—the first time that Germany has been so honoured since the foundation of the movement in 1908). Between these major events the ten working commissions in several dozen countries discuss their "homework" in very friendly atmospheres about twice a year. At these smaller and more frequent conferences, the chaff is sifted from the wheat, so that only worthwhile topics are presented at the big four-yearly shows. Last month's conference at Cambridge brought

together 16 countries and 125 delegates and useful deliberations under four main headings took place. A short report on the event appears on page 1,027 of this issue.

● The three major frozen food producers have announced recently their use of electronic thawing equipment. The use of such plant is tied to the economics of handling fish at sea. As British trawlers have been forced to fish further and further from these shores, owing to such causes as the Iceland dispute, so icing of catches becomes less effective and quick-freezing at sea becomes more and more the answer to proper preservation. In one instance at least, the quick-frozen blocks are thawed out on landing and sent into the normal channels of distribution. This electronic thawing plant employs the "radio frequency water immersion method" which was proposed during 1960 to the Torry Research Station at Aberdeen where much of the initial process development work was carried out. World patents are now being filed for this process.

● Increased costs are now facing Scottish refrigeration cabinet builders as a result of wage increases in the building industry. Cabinet construction is handled to a considerable extent by firms traditionally concerned with timber frame construction and the increases affect all such firms. A shorter working week and a 10 per cent. wage increase will impose considerable additional costs on such firms and unless these can be absorbed by reorganization, more efficient production and elimination of other costs, the result would seem to be an increase in the price of the finished product. Already, much has been done to streamline the industry and to reduce production costs to the barest essentials so that little scope exists for further acceptance by the manufacturers of the new increases. A 10 per cent. advance in prices would obviously be opposed by buyers and is indeed undesirable from the viewpoint of the manufacturers as well. Some compromise will be necessary but the final result may well be a necessity for a general increase in cabinet costs. This would be particularly unwelcome in view of the current pause in buying. The past few months have been definitely less productive of new orders, suggesting that buyers are becoming increasingly cautious in their ordering. The overall position is not particularly unattractive, however, since massive redevelopment of retail outlets is still proceeding. The supermarket boom is following on the heels of the earlier self-service boom. Self-service conversions are still being made at a steady rate and the whole trend of retailing is towards multi-trade operation within one major floor. Where this is impossible because of space considerations, the trend is still towards refrigerated display within the smaller areas, towards elimination of the traditional counter and replacement of self service refrigerated units or serve-over refrigerated counters. The multiples and co-operatives are still leading the boom and show every sign of continuing this work. The retail private traders have been forced to follow on and they too are buying substantially the smaller type refrigerated units.

● Whether or not she is unduly concerned about the possibility of Britain joining the Common Market, Australia is looking to North America for increased trade in meats. A new shipping service has started between Australia and North America, and will expand further the rapid growth of trade routes across the Pacific. The Danish-owned Lauritzen Lines is running refrigerated ships between Australian ports and the west coast of the U.S.A.

and Canada, crossing the Pacific in 16 days. The Danish venture is the third by overseas shipping companies in the Australia-North America trade in the past 12 months. American and Swiss shipping lines recently started running fast refrigerated ships to carry meat and other perishable cargoes from Australia. Mainly as a result of the meat trade, the number of cargo ships plying the Pacific has increased considerably in the last few years.

1st INTERNATIONAL REFRIGERATION FAIR 1962

THE first International Refrigeration Fair will be held in the Grand Hall, Olympia, London, from April 13 to 19, 1962. Here will be presented the most important display of refrigeration equipment, materials and services ever to be arranged in this country.

Many major British manufacturers and suppliers of refrigeration and ancillary equipment have already booked space amounting to well over half the total floor area available. The attached list of exhibitors will give some indication of the scope and importance of the Fair, which will reflect all that is best in this greatly advancing field, and one that is making a considerable contribution to the British export drive.

The exhibits will include: refrigeration power plant; insulation and refrigeration construction; instrumental equipment; cold storage and quick-freezing processors' equipment; heat-exchange equipment, refrigerants, etc.

A strong overseas interest is anticipated and already the organizers, Contemporary Exhibitions Limited, have received numerous applications for tickets from Scandinavian and other European countries.

The International Refrigeration Fair is sponsored by the British Refrigeration Association, and enjoys the active support of the following national organizations:—

The Domestic Refrigeration Development Committee; The Institute of Refrigeration; the National College for Heating, Ventilating, Refrigeration and Fan Engineering.

and is approved by:—

The British Plastics Federation; The Society of Motor Manufacturers & Traders.

EXHIBITORS

British Refrigeration Association
1 Lincoln's Inn Fields, London, W.C.2.
Chrysler Airtemp Ltd.
68 Knightsbridge, London, S.W.1.
Craig-Nicol Ltd.
659 Pollokshaws Road, Glasgow, S.1.

De Laval Ljungstrom (Great Britain) Ltd.
129 Kingsway, London, W.C.2 (Sweden).

William Douglas & Sons (Engineering) Ltd.
Brewhouse Street, London, S.W.15.

D. Drake & Son Ltd.
Cromwell Road, Bournemouth.

Ekco Plastics Ltd.
Ekco Works, Southend-on-Sea, Essex.

Eldwood Ltd.
Fourth Way, Exhibition Grounds, Wembley, Middlesex.

Frigidaire, Division of General Motors Ltd.
Stag Lane, London, N.W.9.

J. & E. Hall Ltd.
Dartford Ironworks, Dartford, Kent.

Husmann British Refrigeration Ltd.
242 Tottenham Court Road, London, W.1.

Robert Ingham Clark & Co.
93 New Cavendish Street, London, W.1.

"J.D." Insulating Co. Ltd.
Hawthorne Road, Bootle, Liverpool, 20.

Jablo Plastic Industries Ltd.
Jablo Works, Waddon, Croydon, Surrey.

Jackston Froster Ltd.
Humber Bridge Road, Grimsby, Lincolnshire.

B. Jaquiss & Sons Ltd.
Regal Works, Gorton Road, Manchester, 12.

Johnson, Matthey & Co. Ltd.
73 Hatton Garden, London, E.C.1.

Kelvinator Ltd.
Chiswick Flyover, Great West Road, London, W.4.

Kenwood Manufacturing (Woking) Ltd.
Kenwood Works, Old Woking, Surrey.

Harry Lawrence Ltd.
Orchard Works, Five Oak Green, Tonbridge, Kent.

London Fan & Motor Co. Ltd.
331 Sandycroft Road, Richmond, Surrey.

Magnetic & Electrical Alloys Ltd.
Burnbank, Hamilton, Lanarkshire.

National College of Heating, Ventilating, Refrigeration & Fan Engineering
Borough Road, London, S.E.1.

Paxman Cooler Manufacturing Co. Ltd.
34 Little Horton Lane, Bradford, 5.

Petters Ltd.
Staines, Middlesex.

Alfred Porter & Co.
Stella Works, Stanley Road, Teddington, Middlesex.

Pressed Steel Co. Ltd.
Cowley, Oxford.

Qualcast Ltd.
Victory Road, Derby.

Ranco Ltd.
54 Cheam Common Road, Worcester Park, Surrey.

Refrigeration Press Ltd.
131 Great Suffolk Street, London, S.E.1.

Salford Electrical Instruments Ltd.
Peel Works, Silk Street, Salford, 3.

Sanyo Electric Company Ltd.
c/o Marubeni-Lida Company Ltd., Moor House, London Wall, London, E.C.2 (Japan).

Saro Products Ltd.
Folly Works, Whippingham, East Cowes, Isle of Wight.

David Scott & Company Ltd.
Kelvin Avenue, Hillington, Glasgow, S.W.2.

H. C. Slingsby Ltd.
89 Kingsway, London, W.C.2.

Smithfield Refrigerator Company Ltd.
High Street, London, N.8.

The Standard Insulator Co. Ltd.
Standard Works, Bridge Road, Camberley, Surrey.

L. Sterne & Co. Ltd.
Sternette Works, Kelvin Avenue, Glasgow, S.W.2.

L. Sterne & Co. Ltd.
158 North Woodside Road, Glasgow, N.W.

Telcon Metals Ltd.
Manor Royal, Crawley, Sussex.

The Telegraph Condenser Co. Ltd.
North Acton, London, W.3.

Tempair Ltd.
Romney Place, Maidstone, Kent.

Temperature Ltd.
Burlington Road, London, S.W.6.

U.D. Engineering Co. Ltd.
Cumberland Avenue, London, N.W.10.

Wilmo: Breeden Ltd.
Amington Road, Birmingham, 25.

York Shipley Ltd.
North Circular Road, London, N.W.2.

Yorkshire Imperial Metals Ltd.
P.O. Box 166, Leeds, Yorkshire.

NEWS OF THE MONTH

Refrigeration and A-c Exports.—During August, 1961, air-conditioning and refrigerating machinery and fans (commercial and industrial sizes) to the value of £659,434 weighing 1,111 tons was exported from the United Kingdom. Comparable figures for August, 1960, were 846 tons, worth £592,574.

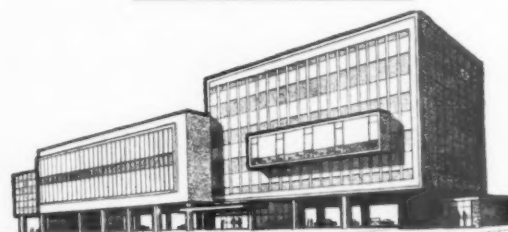
Exports' Analysis.—Of the 1,111 tons of air-conditioning and refrigerating plant worth £659,434, exported by Great Britain in August—quoted in the preceding paragraph—26 tons went to the Union of South Africa, 4 tons to India, 37 tons to Australia, 16 tons to New Zealand, 26 tons to Canada, 168 tons to other Commonwealth countries, 57 tons to Eire, 8 tons to Sweden, 23 tons to Western Germany, 54 tons to the Netherlands, 89 tons to Belgium, 213 tons to France, 16 tons to Italy and 374 tons to "other foreign countries."

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigeration machinery during August, commercial refrigerating machinery accounted for 120 tons worth £80,556, industrial plant and equipment for 246 tons worth £119,581, and refrigerating

machinery, equipment and parts for 355 tons worth £228,492.

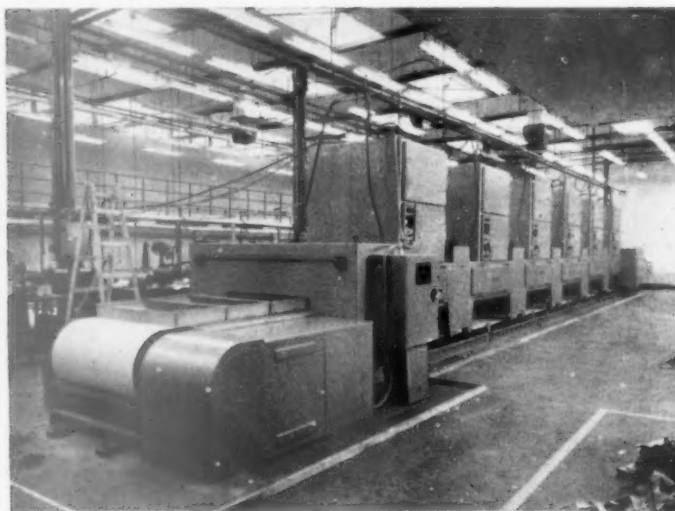
Exports of Small Refrigerators.—During August, 1961, 568 tons of complete refrigerators and domestic refrigeration equipment were sent overseas from Great Britain. These exports were worth £349,552. The

568 tons comprised 5 tons to the Union of South Africa, 3 tons to Rhodesia and Nyasaland, 18 tons to New Zealand, 34 tons to Canada, 241 to "other Commonwealth countries and Eire," 21 tons to Sweden, 21 tons to Western Germany, 5 tons to Italy and 220 tons to "other foreign countries."



A new five-storey, 30,000 square foot training centre has been completed for Pressed Steel Co. Ltd., at its Cowley, Oxford headquarters. The new building, which was opened last month by Mr. W. J. Carron, president of the Amalgamated Engineering Union, brings under one roof all the company's training facilities at the parent factory. At any one time, Pressed Steel has up to a thousand people under one form of training or another. The

new training school will also act as a group centre for the specialized training of staff from its other factories, such as Swindon, Linwood (Paisley) and Theale, near Reading, in the extensive facilities which most of them have, for more general training on the spot. Replying to a speech of welcome by Brigadier Alexander Abel Smith, chairman of Pressed Steel Company, Mr. Carron spoke of the "country-wide dearth of trained personnel."



Sir Norman Kipping Visits Japan.—Sir Norman Kipping, Director-General, and John Whitehorn, Deputy Director (Overseas), of the Federation of British Industries are visiting Japan from October 4–21. During their stay Sir Norman and John Whitehorn will have discussions arranged by the Keidanren—the equivalent in Japan of the F.B.I.—and will visit a number of Japanese factories. They will also be visiting the British industrial and commercial communities in Tokyo and Osaka.

This Radyne 120 kW. electronic fish thawing plant has been designed and built for thawing blocks of frozen whole white fish at the rate of one ton per hour or herring at the rate of one and a half tons per hour. It has been supplied to Associated Fisheries Ltd., whose new stern trawler "Lord Nelson" docked at Grimsby recently after her maiden voyage.

New Appliances for Swansea.—

The first of a new range of household appliances is being launched during October by the Prestcold Division of Pressed Steel Co. Ltd. They are: an automatic dishwasher and a food waste disposal unit. Until now, Prestcold have confined their production mainly to refrigeration equipment. Their decision to enter into other fields of the domestic appliance industry was first announced two years ago when they transferred their manufacturing plant from Cowley, Oxford, to a new £5,500,000 factory at Swansea, South Wales. These two new products are the first of which will ultimately form an extensive range of household appliances additional to the famous Prestcold "Pack-away" refrigerators.

* * *

F.B.I.'s Technical Director.—Dr. D. H. Sharp has been appointed director (technical) of the F.B.I. as from November 1, 1961. He will take up the appointment on the retirement of the present technical director, Major-General A. J. H. Dove, who is leaving the Federation at his own request at the end of October in order to devote more time to voluntary work. At present Dr. Sharp is assistant to one of the managing directors of Fisons Ltd. In 1951 Dr. Sharp was invited to join Pest Control Ltd., to apply special liquid phase absorption tech-

niques to a difficult effluent disposal problem. When this company was acquired by Fisons Ltd. in 1954 he was works manager at Harston. Previously Dr. Sharp was engaged on studies of the continuous firing of pottery and on fuel efficiency matters for the British Ceramic Research Association. Immediately after the war Dr. Sharp inaugurated the research department of Sutcliffe, Speakman & Co. Ltd. During the war he was with the Chemical Defence Research Department (Ministry of Supply) at Porton, Wilts. Dr. Sharp, who is 44, is an

honours chemistry graduate of London University and a fellow of the Royal Institute of Chemistry. He was awarded his Ph.D. for a thesis dealing with some aspects of liquid phase adsorption.

* * *

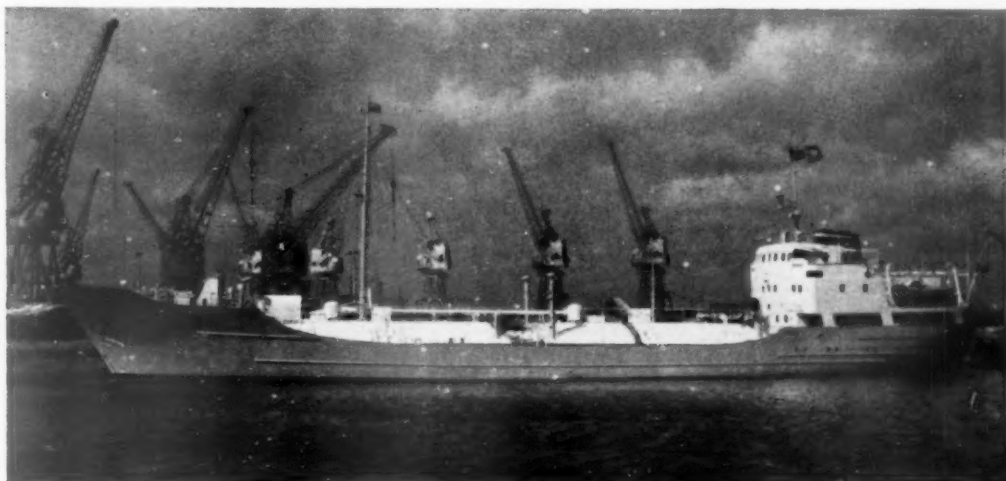
D.S.I.R.'s Removal.—The D.S.I.R. headquarters removed at the end of August to State House, High Holborn, London, W.C.1, (Telephone, Chancery 1262). State House is a new 15-storey block about three minutes' walk from Holborn underground station on the north side of High Holborn.



A new 21-ft. caravan has been specially built for the Times Food Products Company Limited to provide a mobile meeting place and centre for the demonstration and introduction of frozen food products by the Tempo sales force all over the country. It is also to be used for specific promotions with large retail outlets. The equipment aboard includes a low temperature cabinet.

PICTURE OF THE MONTH

After more than a year's successful experience of transporting butadiene in the special tankers for liquefied petroleum gases owned by A/S Kosangas of Copenhagen, I.C.I. Heavy Organic Chemicals Division is now using the latest and largest vessel of the fleet—the 800 ton "Lili Tholstrup," seen in the photograph at West Hartlepool. A particular point of interest about this vessel is that she is capable of refrigerating her own cargo. Butadiene is used in synthetic rubber production.



Low Temperature TUNNEL EXCAVATION

Modern Technique for Canadian National Railways

A NEW sub-surface refrigeration technique was used for the first time in Canada recently to overcome subsidence dangers during the reconstruction of some 175 ft. of the Mount Royal Tunnel, Montreal, for Canadian National Railways. The method was used in the removal of a 140 ft. length of centre supporting wall and two roof arches inside the Central Station end, or south portal, of the tunnel, a single reinforced concrete arch being erected in their place and 1,800 ft. of track being rearranged.

Because of the existence of a stratum of quicksand and the danger of subsidence on surrounding building foundations normal methods of excavation were considered inadvisable over about 140 ft. of the new tunnel.

Under these conditions, the decision was made to stabilize the ground by freezing. No data was available to the contractors in Canada about this method and the nearest approach to the problem was the practical application at the site of the Grand Coulee Dam on the Columbia River in the United States where an arch dam of ice stopped a lava-like flow of fine glacial silt containing 20 to 25 per cent. of colloidal material.

The technique used in the U.S. project was of great value in adopting basic assumptions for computing the rate of freezing and details of freezing procedure on the Montreal project. In addition, the Foundation Company of Canada Ltd. team charged with working out the capacity of the refrigerating plant, sizing and spacing of vertical freezing pipes and the general layout of headers, manifolds and circuits consulted Foraky Boring and Shaft Sinking Co. Ltd., of England, with whom Foundation has a standing arrangement for consulting services. The refrigeration specialists, J. & E. Hall Ltd., at their Montreal office, were also consulted.

Although this application is said to be the first use in Canada of mechanical refrigeration in civil engineering construction work, the method had previously been used to stabilise soil in deep-shaft mining through heavy overburden and similarly in salt-mining operations in the Windsor, Ont., area.

The refrigerating plant used was composed of two compressors, each having a capacity of 74 tons ice-making/day. This capacity was greater than required

to do the job but undoubtedly helped to speed up the operation by allowing the contractors to chill the refrigerant to a lower temperature than originally planned without placing any undue strain on the compressors, each of which was equipped with a 75 h.p. motor.

In an area measuring 80 ft. by 50 ft., comprising some 80,000 c.ft. of unstable soil below street level, an intricate system of interconnected pipes was in-

By J. GRINDROD

stalled. The vertical units, consisting of double-walled steel pipes with an outside diameter of 2½ in. and a 1 in. inside diameter, were fed by horizontal header pipes which had been placed around the perimeter of the area. Approximately 170 in number, the pipes were 17 to 20 ft. long and spaced 4 to 6 ft. apart. The system carried 10 tons of refrigerated methanol solution supplied by the two powerful compressors and a heat exchange unit.

In general, the freezing operation was performed by three cooling circuits: the refrigerant solution methanol and water which cooled the material to be frozen; the "Freon 12" system which cooled the methanol solution; and the cooling water system which cooled the "Freon." The methanol, at -10°F., was circulated by pump through the freezing tubes and returned to an open tank. A second pump drew the methanol from this tank and pumped it through the heat exchange unit. The cooling water was afterwards wasted to a nearby sewer.

During a three-month period, a carefully worked out system of refrigeration was in operation in this rectangular area, freezing the ground to a depth of 18 to 20 ft., well below frost level.

Based on certain assumptions from known refrigeration data, the size and spacing of the freezing tubes and the capacity of the refrigerating units, it was estimated that a start could be made on excavating in the underground phase of the tunnel reconstruction six weeks after the start of freezing and that the job could be finished six weeks later.

In actual operation, the freezing of the ground proved so effective that a start was made in less than four weeks after the start of freezing. After this period, the ground was frozen so hard that no great difficulty was experienced in drilling and blasting the frozen material, which broke up somewhat like rock.

As the tunnel excavation advanced, each row of freezing pipes was taken out of service as it was reached. The refrigerant solution was blown out of the disconnected row of vertical freezing pipes before blasting and the ends of the pipes projecting into the excavation were used as scaffold hangers for drilling and for erecting steel liner plates and ribs which

served to hold the ground before the arch roof was concreted. When all the reinforced concrete work was completed, a finishing coat of cement was applied by the Gunit method to give a smooth, easy to clean finish.

It is considered that this freezing method of construction has been most successful and economical in consolidating a very unstable stratum of soil and is expected to prove applicable to other projects where an unstable stratum of soil exists.

The Foundation Company project manager was Mr. D. H. Traynor, while W. J. Storey was the superintendent and G. J. Low the engineer.

PRESSURIZATION PLANT FOR AIRCRAFT

Among plant on show of interest to the refrigeration and air-conditioning industries at this year's Farnborough Show, that exhibited by Sir George Godfrey & Partners Ltd., specialists in the design and manufacture of components for aircraft pressurizing and air-conditioning systems and the equipment required for maintaining these systems, attracted particular attention. Also manufactured are turbo alternators for airborne application and air cycle cooling sets for G.W. systems. The company's main exhibit at this year's S.B.A.C. static display was a Godfrey /SRM gearbox compressor type GB80/210 Mk. 1. Four gearbox compressors of this type provide the charge air for the pressurizing and air-conditioning system in the Vickers VC-10 aircraft; each is mounted on and driven from an engine installation. Automatic proportional control of the air mass flow delivered by the compressors is regulated by two electro-pneumatic

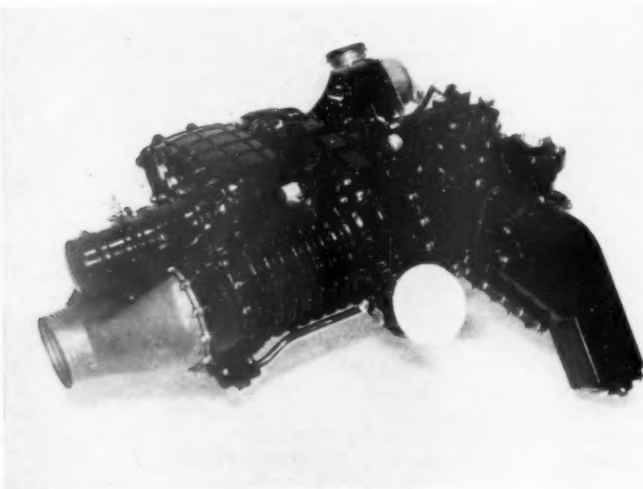
Godfrey mass flow controllers type FC-10, each monitoring the positions of hydraulically operated slide valves on a pair of compressors. A gearbox compressor consists of a speed increase gearbox to which is dowelled and bolted a rotary screw-type compressor incorporating a slide valve and balance piston assembly. A vertical quill shaft in the gearbox engaging a drive from the engine transmits power through spiral bevel gears to a quill drive in engagement with serrations in the male rotor of the compressor. The effective operating length of the two helically-lobed intermeshing rotors in the compressor is controlled by the slide valve, which also controls the opening and closing of an integral intake spill duct. An oil system incorporated in the gearbox compressor provides the hydraulic power for operation of the slide valve and lubrication of the gears and bearings.

At sea level, with the aircraft engines set at take-off speed, the

slide valves are in the minimum delivery position and three-quarters of the air flow to the compressors is directed through the intake spill ducts. On the climb, the valves are inched to the maximum delivery position, which is reached at an altitude of 40,000 ft. with the engines set at cruise speed, when the spill ducts are fully closed. Manual control of the slide valves is provided in the aircraft electrical circuit by selector switches which override the automatic control and also permit isolation of the compressors. In the event of an hydraulic failure the balance piston, which is subjected to delivery air pressure, moves the slide valve to the minimum delivery position.

* * *

The Commercial Plastics Group of Companies announces the formation of a new subsidiary—**Plastic Containers Ltd.**—which has been established to give added emphasis to the promotion and utilization of the group's products in the development and manufacture of containers and finished packs. This company will offer complete design, advisory and production facilities for plastic packaging, based on the products of the Commercial Plastics Group. It has been felt for some time that many large scale packaging applications in this country have been held back partly through lack of a centralized source of information on materials, equipment and design, and partly through lack of development facilities on which the manufacturer can rely until he is fully equipped to meet his own packaging production requirements. The new company will aim to provide such services. Plastic Containers Ltd., will operate from Berkeley Square House, Berkeley Square, London, W.1. (Telephone number MAYfair 8030).



Godfrey gearbox compressor.



One of the two air-conditioned workshops at London Airport.

1. Carlyle 38E air-cooled condensing unit positioned at high level.

2. Carlyle 38R5 air handling unit.

3. Ductwork taking return air at 10w level from conditioned space.

Air-Conditioned Workshops at London Airport

WITH the continued introduction of new techniques and processes, standards of manufacture and assembly have risen sharply to keep pace with modern practice. Specialized service departments are employed where the utmost care is taken to ensure that conditions are strictly controlled so that checks and running tests can be made without interference from outside sources.

At London Airport, in B.O.A.C.'s headquarter's building, engineering hall, two workshops, in which hydraulic components are serviced, have each been provided with a complete air-conditioning system to ensure a dirt-free atmosphere and improved working conditions for the operatives. The requirements of this installation necessitated the provision of controlled conditions in two elevated workshops in the main engineering hall, with internal design temperatures of 68°F. dry bulb and 56.9°F. wet bulb, when the main engineering hall conditions are 75°F. dry bulb and 68°F. wet bulb.

Because the type of work carried out in these workshops involves the overhaul of aircraft pumps, running at up to 4,000 revolutions per minute and other hydraulic gear all working to very close clearances, high emphasis was placed on the air filtration duties of the plant. The specification of the dirt particle

size was fixed at a maximum of 5 micron. The workshops, being long and narrow with limited head room, produced several difficulties during the design stage. Total allocated floor space of the two areas is 14,030 sq. ft. with only 8 ft. head room; in addition at ceiling height several obstructions impeded air flow and limited the choice in location of ducting.

Floor space was at a premium and necessitated the location of air-conditioning equipment outside the workshops. Because of these stringent requirements, carefully selected unitary conditioners were employed. The units chosen were two 38E/R split packaged air-conditioners manufactured by Carlyle Air-Conditioning and Refrigeration Limited, London, each unit drawing 6,900 lb. of air per hour to the workshops. To control conditions accurately within the workshops an electronic control system is used as manufactured by Honeywell Controls Limited comprising a primary controller in the return air duct, a low limit control in the supply air duct, with an interlocking stage between cooling and a small quantity of re-heat to correct relative humidity.

The Carlyle system is composed of two separate units in which the condensing unit (38E) is separate from the air handling unit (38R).

In locating the plant, space was created by fabricat-

ing a steel platform above the access stairs to the workshops, on which the 38R5 air handling units were located. The air cooled condensing units (38E) were supported above the workshop roof, which allowed the dissipation of the rejected heat at high level.

Conditioned air is introduced on one side of the workshop by six fully adjustable grilles, whilst return air passes through grilles positioned on the same side of the shop at low level. This return air moves at a low velocity to obviate discomfort to the operators' feet and legs.

In addition to the workshops, the scheme also includes three small offices of 700 sq. ft. floor area.

During the installation period it was necessary that



Interior view of workshop—conditioned air is introduced at high level through ductwork.



Carlyle 38R5 air handling unit located on platform above access stairs.

work continued in the shop as normal. The absence of foundations and the minimum of builders work, a feature of this type of equipment, enabled the system to be completed precisely on schedule.

At the completion of the work, a recording thermometer was placed in the spaces and temperature was held constant to within $\pm 1^\circ\text{F}$.

The main heating and ventilation contractors were Benham's & Sons; air-conditioning equipment was installed by Bland Refrigeration Limited, one of Carlyle's main dealers; controls and wiring of controls were carried out by Gratte Bros. The air-conditioning system itself was designed by staff of B.O.A.C.'s Properties and Services Branch.

NEW ICE CREAM FREEZER

CLARKE-Built Limited of Chiswick, London, have produced a new continuous ice cream freezer called the "Universal."

This machine has been developed to meet the demands of modern production lines and reduces the times of post-freezer processes, while at the same time the quality and texture of the ice cream is said to be improved.

The advantages of producing really low temperature ice cream from the freezer may be well-known, but the special action of the new freezer does much more than reduce temperature.

The Clarke-Built "Universal" freezer introduces a new conception in ice cream production. A greater proportion of latent heat is now removed and an altogether finer, firmer and smoother product results from the intimate and thorough action of the two-stage operation.

When used for bulk production, the new freezer provides an ice cream which is of uniform firmness and texture throughout the whole container into which it may be filled. The subsequent relatively slow air hardening is greatly reduced or eliminated. Thus a much more consistent temperature is ensured.

The new "Universal" process is perhaps a most opportune development if the use of plastic containers or containers with plastic liners is contemplated, since the firmer more homogeneous product will suffer less by the possibly slower heat transfer of the plastic wall. Thus the use of single service containers comes a stage nearer to practical realization.

When used for extrusion into continuous tunnels, the new machine provides the ability to increase throughput by reason of the reduced duty on the tunnel refrigeration. Very considerable increase of capacity can thus be obtained from the tunnel, with the added advantage of a better product and, if desired, a higher and safely held overrun.

The freezer comprises two independent cylinders arranged in series flow. Refrigerant circulation is by the well-proved ejector system which operates without

refrigerant pumps. The two cylinders have independent refrigerant circuits, each with its own liquid control and back pressure valves. This arrangement provides for a wide and effective range of control enabling a wide variety of duties to be handled successfully and easily. The refrigerating requirement for this machine is 15 tons (180,000 B.t.u. per hour; 45,000 calories per hour) calculated at -22°F. (-30°C.) at the freezer. One driving motor is provided. This is of the enclosed protected, slipring type, and is housed within the lower cabinet. This motor is of 30 h.p. and has independently mounted hand operated starter with in-built, indicating ammeter. The freezer is stainless steel clad, the cabinet being provided with large lift-off doors giving ready access to drive, motor and refrigerant controls. All food contacting parts are of stainless steel or other sanitary non-corroding metal.

Baker Perkins' New London Offices

AN appeal to the Government for a preferential bank rate for the export trade on long term credit sales was made by Mr. Harold Crowther, chairman of Baker Perkins (Exports) Ltd. on the occasion of the official opening of the company's new offices in Stanhope Gate, London, W.1. Mr. Crowther was introducing the Rt. Hon. F. J. Erroll, Minister of State, Board of Trade, who performed the opening ceremony.

Mr. Crowther said that the Government was penalizing the home market and this could have serious repercussions in the export market if research and development had to lag behind due to enforced economies which might have to be introduced to counter some of the recent measures taken by the Government, particularly where credit and high interest rates were concerned.

British manufactures, said Mr. Crowther, were now playing the role of the former banking institutions and having to provide long term credits if sales of capital equipment were to be effected.

"Although we have been greatly assisted by the Export Credits Guarantee Department we still require even further assistance if we are to compete with more aggressive countries," he said.

The Government had resisted appeals for incentives for exporting companies either by tax relief or subsidies, yet the German exporter benefited from his exports as compared with domestic sales by relief of the turnover tax on his exports.

The American exporter, who was having quite a success in Europe, had the help of lower interest rates, coupled with the assistance of the Import-Export Bank. He was able to accept long term credit sales with great advantage over British competitors.

"It is not possible to design essentially for the export market where capital equipment is concerned," said Mr. Crowther. "We cannot indulge in technical risks at long distance. Without a solid home market with which to support our company's design and development of specialized machinery and gain experience, we would not have obtained the results overseas. Time and again we have proved the necessity of being technically advanced in the home market in order to exploit similar techniques overseas."

Mr. Erroll said in reply that he did not think it was the right occasion to indulge in a debate on Government policy. He would, however, consider carefully Mr. Crowther's remarks. He was amazed, when told by different people of the difficulties that were hampering

British exports, that we had any exports at all. Nevertheless, the year's rate of £300 million a month was quite an achievement. But, like Oliver Twist, he was always asking for more. He understood that last year had been a record one for Baker Perkins in the export market and he hoped the company would not be satisfied with that but would make this year an even better one. The new offices would greatly assist in the achievement of this goal and he wished everyone concerned all success.

The new offices have been named Westwood House after the parent concern's head office and works in Peterborough, Northants.

As well as housing the export department, they will also be used by home sales managers, Baker Perkins Jaxons Ltd., James Halley & Sons Ltd. and Steele and Cowlshaw Ltd.

The building has a frontage in the Georgian style in keeping with the surrounding property. It comprises six floors with a basement which has a car lift and accommodation for eight cars. The upper floors are divided into two blocks linked by a service block which houses the lift, stairs and washrooms.

The fourth floor has been designed as an executive suite with the board room, managing director's office, an office for board of management members and a lounge which also has facilities for showing films.

The sixth floor is occupied by a small drawing office and leads on to a roof garden which the staff will use in summer months.

"Isol" deepfreeze cabinets are being marketed in the U.K. by Strommen Engineering Ltd., London. These are chest type models, H.180, H.350, H.460 and H.585, selling at between £125, including installation, and £225. "Isol" are manufactured in Norway.

Van West refrigeration products, made by W. van West and Zonen C. V. of Holland are being marketed in Britain. They include water coolers, beer coolers, medical low temperature cabinets, service cabinets and room air-conditioners.

Howards Refrigeration (Wholesale) Ltd., of Bedford, arranged a special refrigeration display at their showrooms in the City on three days earlier this month. Cheese, wine and delicatessen shows were featured.

The **I.I.R.** meets in Cambridge

FOUR COMMISSIONS IN SESSION

DELEGATES to Commissions 2, 3, 6b and 8 of The International Institute of Refrigeration registered at Downing College Cambridge last month to present and discuss nearly 40 technical and scientific papers.

The above-enumerated commissions deal with :— Commission 2 Transfer of heat : thermal properties of materials : instrumentation : insulating materials ; 3 Design, construction and operation of machinery for refrigerating and air-conditioning plants ; 6b Applications of refrigeration excluding foodstuffs and agricultural foodstuffs ; 8 Refrigerated transport by water.

One hundred and twenty-five registrations were recorded from sixteen countries. Unfortunately, the large Russian delegation did not arrive.

Director of the I.I.R. organization in Paris is, of course, M. R. Thévenot and he seemed well pleased with this gathering of commissions in Britain. Largely responsible for the success of the series were the U.K. Governmental I.I.R. committee ; Mr. K. C. Hales, who is on that committee and is technical director of the Ship-Owner's Refrigerated Cargo Research Association—which body was keenly interested in Commission 8—was virtually in the position of host. The Ship-Owners' Association and the British Refrigeration Association gave a delightful reception and dinner on the closing night—this banquet was held in the dining halls of Downing and Sidney Sussex Colleges.

A reception was given on the opening evening by a group of insulation firms.

Contributing handsomely to the overall arrangements for the conference were : The Expanded Rubber Company Limited, Croydon ; Fibreglass Limited, St. Helens ; J. & E. Hall Ltd., Dartford ; Imperial Chemical Industries Ltd., London ; Jablo Plastics Industries Ltd., Croydon ; Smiths Insulations Ltd., Burton-on-Trent ; Westwick Frosted Products Ltd., Norwich.

Half-way through the conference visits were paid :— To the liners *Arlanza* and *Ruahine*, by courtesy of the Royal Mail Lines and New Zealand Shipping Co.

Ltd., respectively ; to J. & E. Hall's factory and offices at Dartford and to Westwick's Cold Store at Westwick.

The technical sessions were held in the well-equipped University Engineering Laboratories at Cambridge.

The papers presented are listed on page 1029.

* * *

ONE whole day during the meetings was set aside for industrial visits. Trips were arranged to visit London Docks, to J. & E. Hall Limited at Dartford, and to Westwick Frosted Products' quick-freezing plant at Westwick, Nr. Norwich, as stated above.

Thirty-two members representing many countries made the journey to Norfolk, and arrived at the factory at 11.30 a.m., where they were welcomed by Mr. V. S. Meadows, and with members of his staff accompanying them, toured the whole of the refrigeration plant, examining the pre-cooling rooms, two blast freezing tunnels, using longitudinal air flow, and one blast freezer using cross blast air flow. This tunnel is loaded by means of a hydraulic ram situated outside the tunnel. Two models of Jackstone Froster's were seen in operation, the senior model and the eighteen station ammonia model, and then the party were taken through the packaging bays where Ross consumer packs of frozen peas were being filled.

The party then spent some time in the compressor room, and the new 110 h.p. Veebloc Hall machine and the Fuller rotary compressor aroused considerable interest. These machines were recently installed by J. & E. Hall Ltd., and operate in conjunction with the new continuous pea freezer.

Compound ammonia compressors by Hall's and G. & J. Weir ranging from 75 h.p. down to 35 h.p., thirteen machines in all with a total of 140 tons of refrigeration at -35°F. , engaged the attention of the party for quite some time.

The new Hall 110 h.p. compressor which runs at 960 r.p.m., is a 6-cylinder ammonia machine with a bore of 5 in. and a stroke of 4 in. It is the high stage compressor which, when operating in conjunction

*Copies of the full text may be obtained from the hon. secretary for the U.K., I.I.R., 131, Great Suffolk Street, London S.E.1. All papers with discussions will be published later by I.I.F., Paris, as an annexe to the *Bulletin*.



INTERNATIONAL INSTITUTE OF REFRIGERATION



Meetings in Cambridge

(Key to names on opposite page)



with the rotary compressor, and a bubble type intercooler, has the following total capacity: Evaporating at -35°F. , 590,000 B.t.u./hr.=49 tons refrigeration. The rotary compressor was made by Fuller Freezing Equipment Sales Inc., and is a 50 h.p. sliding vane rotary type ammonia machine which forms the low stage compressor and operates in conjunction with the Veebloc compressor (above) and the bubble type intercooler.

Afterwards the members were received in the recently completed boardroom of the new office block by Mr. A. S. Alexander, Mr. Muter, Mr. Meadows and Mr. Thomas. At the head of the table on either side of Mr. Alexander were Prof. Kayan and Dr. Ibl, with M. Thévenot, Miss Griffith, Mr. Yate Pitts and Mr. William Douglas. In a short speech in

which he thanked Mr. Alexander and other directors of Westwick Frosted Products for organizing this visit—Prof. Kayan said this gathering was as truly representative of all nations as U.N.O., and in his reply Mr. Alexander said from what he had seen of the tremendous spirit of friendliness at this gathering, it was a pity politicians were not able to achieve the same atmosphere as refrigerationists.

After lunch the party left by coach and were taken to Wroxham where they embarked on the river, and were taken via Wroxham Broad down to Ranworth Broad where they again returned to their coach and proceeded to William's Cold Store at Thetford. After a very brief visit looking at this recently completed cold room on the new industrial site at Thetford, the party then returned to Cambridge.

Papers Presented at Cambridge

Commission 2

2.1	Thermal insulation of large tanks containing liquefied gases	Prof. G. Haselden and G. Martin
2.2	Combined longitudinal wall-conduction and countercurrent fluid-flow heat exchange via rheo-electric simulation analysis	Prof. C. Kayan
2.3	Some further experiments on the absorption of moisture by thermal insulating materials	H. Myncke
2.4	Economic thickness of insulation in cold stores	B. Djakovic
2.5	Note concerning sliding doors in cold stores	G. Yate Pitts
2.6	Heat transfer from soil to floors in cold stores	A. Stradelli
2.7	Anisotropy of the thermal conductivity of polyurethane rigid foams expanded <i>in situ</i>	A. Filipe and P. Lainé

Commission 3

3.1	The influence of environmental conditions on the design and operation of air-borne refrigeration equipment	J. D. Gurney
3.2	Application of ejectors as booster compressors for freezing purposes	A. W. Paliwoda
3.3	Pulsations in the suction and discharge lines of reciprocating compressors	S. Czaplinski
3.4	Remarks concerning operation of coil evaporators with forced circulation	K. Gutkowski
3.5	Notes on new absorbants of difluoromonochloromethane vapour	U. Sellerio M. A. Biancifiore

Commission 6(b)

6(b).1	Application of artificial cold to low temperature cooling of mineral oils	Prof. Dr.-Ing. W. Niebergall
6(b).2	Application of regenerators in low temperature engineering	Obering, Wittmann
6(b).3	Fresh water extraction by freezing-out sea water	Dr.-Ing. Messing
6(b).4	Contemplations on the economy of absorption-type refrigerating machines for low temperatures	Obering, E. Hofmann
6(b).5	A novel process for CO_2 ice production	Prof. H. Vahl

1. Downing College; 2. G. Yate Pitts, Prof. C. F. Kayan and E. G. Russell Roberts; 3. G. L. H. Bird, A. C. Murdoch and K. C. Hales; 4. A. Korsgaard and W. S. Douglas; 5. G. R. Scrine, T. Telfer and M. B. F. Ranken; 6. V. S. Meadows, V. Lorentzen, T. Jensen and J. B. Ward; 7. A. Stradelli and B. C. Oldham; 8. J. Faircloth, J. Pimblett, R. G. Wood and J. Schmidt-Jorgensen; 9. R. Edmonds, A. M. P. Brooks, K. C. Hales and J. Stevens; 10. A. G. Sandberg, J. Coleman, P. D. Laing, and G. L. H. Bird; 11. T. A. Raymond, Mrs. Pettman and F. L. Pettman; 12. E. Landry, Prof. P. Lainé and R. Cadillat; 13, 14 and 15, Groups inspecting the Engineering Laboratories.

KEY TO ILLUSTRATIONS ON OPPOSITE PAGE

Commission 8

8.1	Physiological activity of volatile organic compounds produced by fruits	...	Dr. J. C. Fidler
8.2	Ventilation of fruit cargoes from the point of view of the carrier	...	B. Emilsson
8.3	Marine refrigeration problems in Poland	...	R. Lipowicz
8.4	Some factors involved in the design of fish factory and freezing vessels for operation in tropical waters	...	M. B. F. Ranken

Combined Session of Commissions 2 and 3

2.7(b)	New portable instruments for measuring and controlling air humidity in cold store rooms	...	E. Agarev and Mme. I. Pavlova
2.8	Measurement of thermal conductivity at low temperatures	...	Dr. B. Vos
2.9	On the development of a recording hygrometer	...	E. Brendeng
2.10	Transient heat transfer measurements	...	Dr. W. Gogol
2.11	Heat transfer and pressure drop in longitudinally-finned double-life heat exchangers	...	H. G. Hirschberg
2.12	Heat transfer on horizontal film-type cooler	...	K. P. Hupe
2.13	Condensation on heat exchangers	...	H. Henrici
2.14	Some remarks about freezing out of vapours from gas vapour-mixtures	...	Prof. H. Hausen
2.15	On the correlation of the thermal convection coefficients	...	Prof. C. Codegone

Commission 8

8.5	Air circulation in refrigerated ships' holds	...	Prof. G. Lorentzen
8.6	Test study on board a banana ship with upward air circulation	...	J. Damien R. Delabarde R. Deullin A. Gac P. Somma G. Vrinat
8.7	Trunking in refrigerated ships and movement of air over the cargo	...	P. Somma
8.8	New design of ductwork in ship construction	...	M. Banchais
8.9	Paper on air ducts	...	O. Prinzing

Joint Session of Commissions 2, 3, 6(b) and 8

J.S.1	Recent progress made in the construction and design of marine installations	...	A. Neuenschwander
J.S.2	New refrigerants	...	W. B. Gosney

Joint Session of Commissions 2, 3, 6(b) and 8

J.S.3	Modern transportation and uses of cryogenic liquids	...	E. C. B. Corlett
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HEAT EXCHANGER LECTURES

The National College for Heating, Ventilating, Refrigeration and Fan Engineering will hold a course of six lectures commencing Monday, October 23, 1961, at 6.30 p.m. on Compact Heat Exchangers by specialists from industry and Mr. E. Woodcock, M.Sc. (course organizer—lecturer in heat transfer at the National College). The lectures will be given in the National College Building, Keyworth Street, S.E.1. The course is intended for science and engineering graduates with qualifications and experience in heat transfer, who are engaged in some aspect of the design, manufacture, development, selection and operation of compact heat exchangers. It should also be suitable for students with a general interest provided they already have a knowledge of elementary heat transfer. The circumstances in which a

compact heat exchanger is called for will be discussed by reference to actual installations and a close look will be taken at pertinent heat transfer and fluid dynamic phenomena. Lectures will be based upon recent industrial experience and contemporary original research papers.

REFRIGERATION AIDS PAINT TECHNOLOGISTS

A six-chamber temperature test cabinet, designed and supplied by Refrigeration Services Limited, Prestcold distributors of Ashton-under-Lyne, has been installed in the laboratories of W. & J. Leigh Limited, marine paint specialists of Bolton. A full description will appear next month.

Break-through in Thermoelectric Cooling

By R. W. VINEY BROWN, B.Sc. (Eng.)
Grad. I.E.E., S.I. Mech.E.
Grad. Inst. Refrigeration*

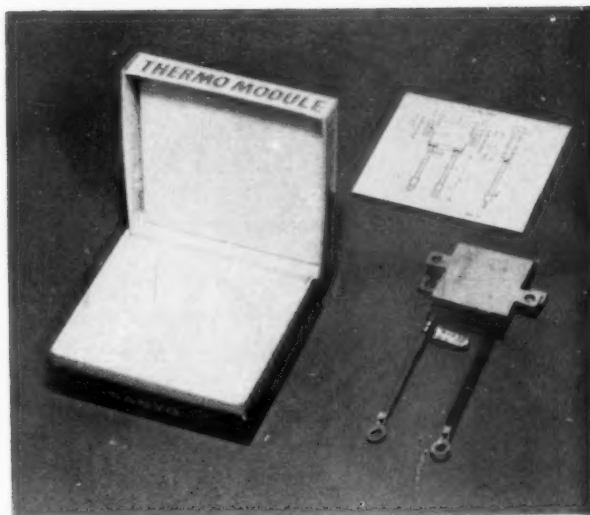


Fig. 1.

THE performance of a thermoelectric cooling system is entirely adequate for consumer applications, the efficiency lying midway between absorption and compression units. Widespread use of this novel method of cooling has been prevented by high capital cost of the semi-conductor cooling batteries employed. The development of a revolutionary type of cooling module by the Sanyo Electric

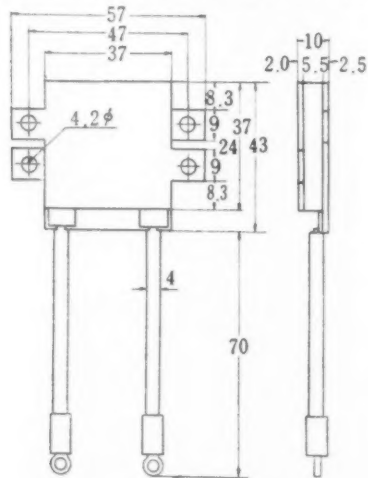


Fig. 2.

Co., Japan, brings thermoelectric cooling into direct competition with conventional methods for the first time. Applications requiring cooling loads of up to 150 B.t.u. per hour are now economically feasible and a range of equipment employing Sanyo thermo modules is now in production.

* Technical Director: C. W. Brown (Engineers) Ltd.

The Thermo Module Cooling Unit

A typical thermo module is shown in figs. 1 and 2. It consists of 10 couples arranged in a battery of compact dimensions and is designed for an operating current of 16 amps. The heat pumping capacity and electrical characteristics are shown in figures 3 and 4. Anodized aluminium plates are bonded to the hot and cold faces of the battery and lugs are provided for ease of attachment to any desired heat exchange system. Other 10 couple batteries are available with optimum current ratings of 12, 21 and 25 amps., respectively.

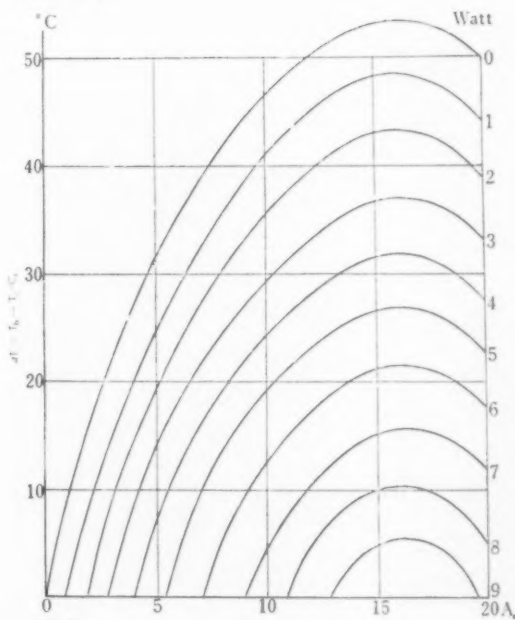
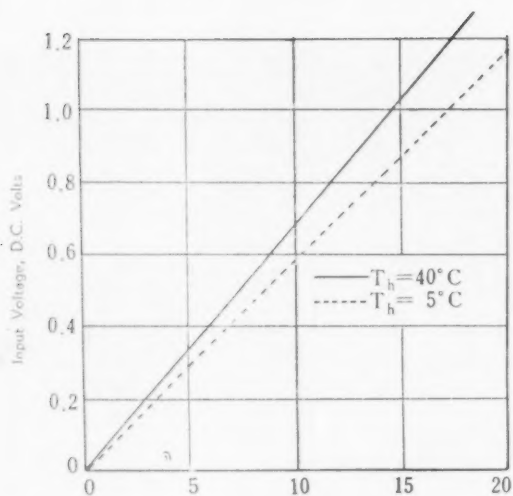


Fig. 3.



Input voltage versus input current for 6-watt heat pumping load

Fig. 4.

Applications

An indication of the performance of thermo modules will be obtained by consideration of several devices currently under production in Japan. The thermoelectric jar, figure 5, is suitable for both domestic and laboratory applications. It is particularly valuable for the storage of plasma, serum and medical chemicals since it is highly portable and may be powered by accumulators. The thermo processing



Fig. 5.

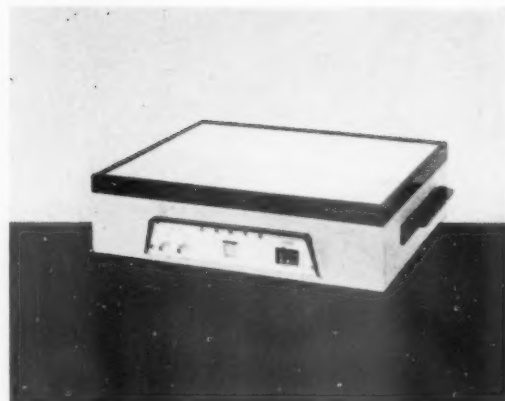


Fig. 6.

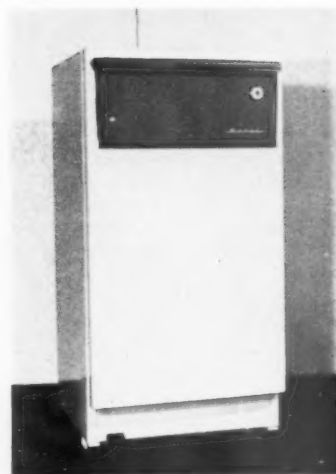


Fig. 7.

tray shown in figure 6 provides a unique method of temperature control for photographic processing. The prototype domestic refrigerator, figure 7, is perhaps, a portent of things to come. The present performance of thermo modules provide an economic limit at around 150 B.t.u. per hour. A new type of alloy with superior properties is under investigation

and it is confidently predicted that applications with thermal loads up to 300 B.t.u. per hour will be feasible by 1963. This will bring thermoelectric cooling into the major domestic appliance field.

Acknowledgments to Marubeni-Iida Co., Ltd., London (Sanyo agents for Great Britain) for permission to publish photos.

VAST NEW BIRDS EYE STORE

BIRDS EYE FOODS LTD., have added yet another 1,586,323 c.ft. of accommodation for quick-frozen foods to the low-temperature storage space at the Great Yarmouth factory. A new cold store was opened on September 26 by the Mayor of this Norfolk town which, although the company now has six factories in different parts of the country, is still regarded as the home of Birds Eye.

Sited a short distance from the factory, where the cased products are loaded on to pallets, the cold store is supplied with its palletised stock by two refrigerated trailers which, by reason of the projection of the loading bank into the low-temperature area within the store, can be off loaded without waiting for the arrival of the fork-lift trucks.



Interior of the new Birds Eye Food Limited's Great Yarmouth cold store, showing the loading bank.

Another advantage of this extension inwards is that the loads for the road transport vehicles can be placed in a forward position ready for loading the next morning. Four fully mechanized double-leaf sliding doors provide access to the store from the loading bank, and there is another door of similar type at ground level which enables quick-frozen products brought to Yarmouth by chartered ships to be unloaded.

The cold store, which faces both the river and the sea, is 341 ft. long, 240 ft. wide, and 19 ft. high. It is steel-framed with aluminium cladding which encloses all projections. The insulation is 8-in. thick polystyrene and between this material and the cladding is a fire-protecting core of 4-in. thick Melcrete thermal block which also envelopes all stanchions.

Cooling is effected by finned coils, which are used because they are less costly than the forced draught system. In planning the lay-out of the coils care has been taken to avoid positions immediately above the gangways, thus preventing the formation of ice on the floor areas over which the trucks travel. Banks of normal coils are installed just inside the doors opening off the loading bank to serve as frost collectors, thus minimizing frost formation on the finned coils within the cold room.

Three ammonia booster sets, each consisting of 80 h.p. booster and 150 h.p. second stage Veebloc compressors were installed to control the refrigeration. This arrangement caters for a temperature of -20° F. with standby capacity, although a temperature of -5° F. only is required for most of the year. However, it has recently been decided to leave out the third set, and although this is still on the site, it is not connected.

The condensers are shell and tube and water cooling is by Thermotank, positioned adjacent to the engine room. A total of 20,000 ft. of 2 in. o.d. piping is in the store with 7 in. square fins, representing a total cooling surface of 133,500 sq. ft. An emergency water supply of 5,000 gallons is stored underground.

Those responsible for the building are :

General design, co-ordination and progressing of work—Birds Eye Technical/Cold Storage Department.

Architect—A. T. Wright, A.R.I.B.A.

Ground works and ancillary buildings—Bush Builders.

Cold Store—detailed design and construction of general structure and insulation—Smiths Insulations Ltd.

Refrigeration—J. & E. Hall Ltd.

Electrical—Birds Eye Technical Department & Unilever Ltd., TD/Eng/Elect. & J. H. Plant Ltd.

Instrumentation and Control—Unilever Ltd., TD/Eng/I & C. Section and J. H. Plant Ltd.

Mechanical Handling—Fork Lift Trucks, Lansing Bagnall and Ransomes, Simms & Jeffries Ltd.; Pallets, Jewson's Ltd., Bamberger's Cases and Pallets Ltd.; Battery Chargers Lansing Bagnall.

STERNE'S introduce "CONSORT" and "VISCOUNT" CABINETS



DESIGNED and built to comply with B.S.I. 3053, 1958, two new refrigerated cabinets took their bow last month before an audience of trade and press representatives. They are the 4 ft. 2 in. long "Consort"—an open-topped frozen food cabinet with a capacity of 9.1 c.ft. at the load line—and the "Viscount," which has a 14.9 c.ft. capacity and is 6 ft. long.

L. Sterne and Co., Ltd., the manufacturers, chose the exclusive, carpeted luxury of a large London hotel for this curtain raiser, and took advantage of the occasion to

show a new fashion line in their other models, such as the "Empress 15" with a higher capacity, at 15.3 c.ft. than its predecessors in the range. The "Empress 15D," a similar model, has an illuminated display shelf, of 3 sq. ft.

New versions of the Jack 9 zero cabinet, with a nett capacity of 6.05 c.ft. were introduced, as were the "Crown Prince" and "Crown Princess," basically the same model, with full open top display areas and a capacity of 9.1 c.ft.

Six and 4 ft. counter tops, and the Sterne bottle cooling shelf, with room for 9 dozen $\frac{1}{2}$ pt. bottles, completed the show.

A film illustrated the careful manufacture of Sterne equipment. The cabinets division has recently undergone complete reorganization in both production and sales sides and the factory has been modernized. Features of the "Consort" produced here include a wide-angled four-ply glass front, incorporating a frost control element to reduce condensation. A plastic coated steel serving shelf in black tops the cabinet and it is finished in polished stainless steel and anodised aluminium trims. Standard production colour is sunshine yellow.

The other star of the show, the "Viscount" cabinet, is really a larger version, incorporating a $\frac{1}{2}$ h.p. Tecumseh compressor as in the "Consort," with a fan cooled condenser. As with the other models it conforms to the British Standard which states that "In an ambient temperature of 90° F. a temperature of not over 5° F. be maintained in all packages when the cabinet is filled to the level of the load-line."

An important difference in this model is that refrigeration is provided by a special finned air cooler which operates by natural air circulation and is said to eliminate fan noise and make possible a display uninterrupted by refrigerated divider plates.



The new Sterne "Consort" frozen food cabinet and the Sterne "Viscount" showing transparent night covers in position.

R.S.A.'s ANNUAL MEETING

The annual general meeting of the Refrigeration Servicemen's Association will be held on October 25, at the Danfoss Lecture Hall, Queensway, London, W.2, at 7 p.m. The R.S.A. welcomes new members. The a.g.m. will be followed by a talk to be given by Dr. S. Forbes Pearson on "Freezing at Sea."

Engineering Centre—U.S.A.

BEFORE the summer waned, American engineering was quartered in its new home, the United Engineering Centre, a 20-storey building on New York's east side, between 47th and 48th Streets facing United Nations Plaza. The 19 major engineering societies and agencies were involved in making the physical move to the new address, including about 650 headquarters personnel of the societies which have a combined membership of more than 300,000.

All except two floors, the 15th and 16th have been occupied. These will remain vacant for possible expansion of the tenant societies or be available for other societies desiring to move into the new structure.

The main entrance to the building is on 47th Street, and besides an attractive marble-walled lobby, the ground floor has a large auditorium with a seating capacity of 450, an exhibit area of over 6,000 sq. ft., and a main lounge. A large cafeteria, together with several private dining areas, occupies the lower level.

The Engineering Societies Library, often called the most comprehensive engineering library in the world, and Engineering Index occupy the second floor and other sub-floor areas for stacks. These areas are reached with a special elevator.

Occupants of other floors are as follows:—

Third floor: United Engineering Trustees, Inc., Engineering Foundation, Engineers Joint Council, Society of Women Engineers, American Institute of Consulting Engineers, Engineers Council for Professional Development, Municipal Engineers of the City of New York.

Fourth floor: American Institute of Industrial Engineers, American Society of Heating, Refrigerating and Air-Conditioning Engineers.

Fifth, Sixth and Seventh floors: The American Society of Mechanical Engineers.

Eighth floor: Welding Research Council, American Welding Society.



Ninth floor: Illuminating Engineering Society, American Institute of Electrical Engineers.

Tenth and Eleventh floors: American Institute of Electrical Engineers.

Twelfth floor: American Institute of Chemical Engineers.

Thirteenth and Fourteenth floors: American Institute of Mining, Metallurgical and Petroleum Engineers.

Fifteen and Sixteenth floors: Vacant and unfinished—for future expansion.

Seventeenth and Eighteenth floors: American Society of Civil Engineers.

The Nineteenth and Twentieth floors will be used for mechanical equipment.



This two temperature cabinet, affording food storage at refrigerated and freezer levels, was put on the market by English Electric as we went to press.



NEW

... Room Air-Conditioner

Specifically designed for the smaller cooling applications, found in offices, small shops and cafés, Carlyle Air Conditioning and Refrigeration Limited, London, have introduced the new 51CC room air-conditioner.

Only 26½ in. wide, 18 in. high and 24 in. deep, this compact unit has a capacity of 18,000 B.t.u./hour, as tested by balanced ambient calorimeter methods.

Two cooling speeds enable the conditioner to operate at immediate top capacity to give rapid cooling when first switched on in an overheated room, then continue to maintain comfort conditions by quiet normal operation. Low noise level at this setting is a special design feature.

Desired comfort level is selected on an easy-to-read control dial and maintained by a built-in automatic thermostat.

A one-piece air deflected is adjustable to any angle of discharge from almost straight out to draughtless overhead distribution, and the large volume airstream (up to 500 c.f.m.), is directed by a centrifugal fan. Air may also be directed to either side by two sets of hidden side air deflection louvers.

Filters can easily be taken out for cleaning by removing the front grille.

Each cabinet is constructed of heavy galvanized steel, finished in baked enamel and complete weighs 210 lb. Price is £215.

... Refrigerator-Freezer

The first British refrigerator of medium size to have an entirely separate "built-in" deep freeze (home food freezer) compartment, was jointly announced last month by Simplex Electric Company Limited (Creda) and



Thorn Electrical Industries Limited (Tricity). By pooling their design, development and production resources Tricity and Creda have been able to produce a 6½ c.ft.,

two-in-one model which will sell on the British market at around 99 gns. (including purchase tax). Both companies will market the new refrigerator under their own brand and model names with difference of styling and finish. The total capacity of the models is 6½ c.ft., including the independent home food freezer compartment which has a capacity of 1 c.ft. A top opening pressure sealed lid gives easy access to the home food freezer compartment and prevents cold air loss, and important feature to the maintenance of sub-zero temperatures. The actual temperature of the items stored in this top compartment, is constantly maintained between -2° and -6° F.

... Milk Venders at Dairy Show

The new multi-selection refrigerated carton vender, two compact hot drink venders, and a versatile refrigerated "general merchandiser" are among the automatic vending machines to be exhibited by Gloster Equipment Limited on Stands 37 and 38 at the forthcoming Royal Dairy Show. Most of these venders are making their first appearance at the Dairy Show. A total of 12 vending machines are to be displayed by Glosters, including three of the distinctive newly styled Gloster VM.35s. These are the four selection refrigerated carton venders which hold up to 304 cartons: vending any carton—1-pint included—currently in production.

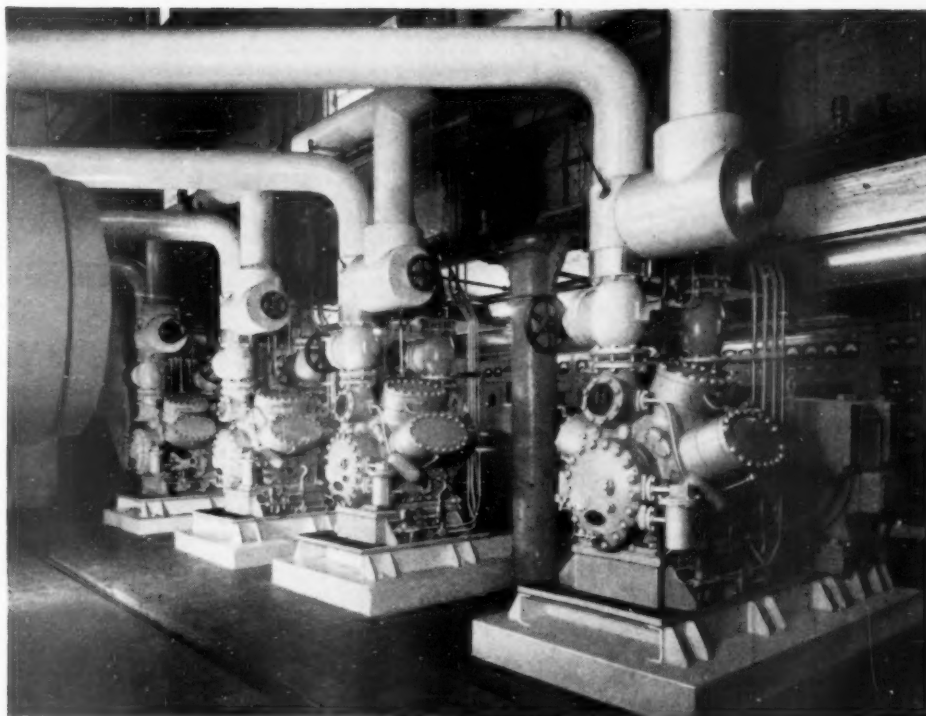
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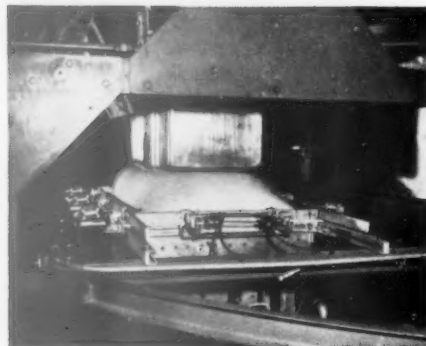
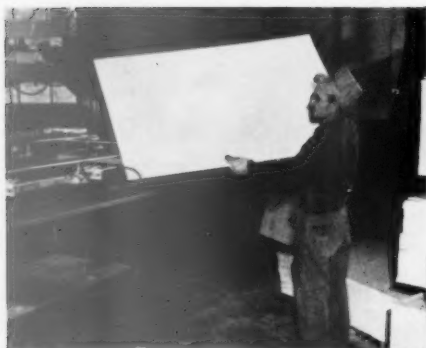
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In brewing, for example, it plays a controlling part in all the processes. The illustration shows the four, 8-cylinder, 5" x 4" veebloc compressors, using ammonia as a refrigerant, supplied to Mann, Crossman & Paulin Ltd., Albion Brewery, London, E.C.1.

J. & E. Hall have supplied refrigerating equipment to all the leading manufacturers in the Brewing Industry.

AP 375



Vacuum Forming Refrigerator Liners

LINERS are being vacuum formed of polystyrene at the Galesburg, Illinois, plant of the Admiral Corporation for refrigerators and freezers of up to 9 c.ft. capacity.

Although the cost of the plastic is higher, the liner is now produced in less than 30 minutes, against an approximate five hours for porcelain enamelled steel. Assembly costs are also lower and fewer parts are needed. Using Dow Styron or Monsanto HT-88 resins, a new machine extrudes sheets over 0.3 in. thick.

Equally important in the operation is a heated plug for the vacuum forming. Heated to 270° the plug stretches the sheet into the mould cavity.

An automatic Brown three-stage rotary vacuum form machine is used. The 33 by 55½-in. extruded sheet is loaded manually in the frame. In the first stage, an oven heats the sheets to 300°. At this temperature, sag in the sheet breaks a photoelectric cell beam indexing the forming machine and moving the sheet to the forming station. A timer provides an added safety factor in the heating operation.

Four steps are necessary in the forming station: (1) mould elevation; (2) forming a bubble of the sheet; (3) vacuum forming; and (4) ejection.

The mould is first actuated by an air cylinder, rises to meet frame and sheet. Incorporated in the mould are undercuts for shelf mounting, slide rails and evaporator frames and bosses.

In the second step, compressed air is blown through the mould to form a bubble of the heated sheet. When the bubble reaches a height of 12 in. it breaks a photoelectric cell beam, triggering the heated plug. The plug descends and forces the sheet evenly into the mould cavity.

In the third step, overlapping with the second, the vacuum is pulled to ensure conformance of the sheet with the mould. As the plug returns to position, cooling fans turn on automatically.

In the final step of forming, the vacuum is broken. As the mould retracts, air pressure is turned on to aid in separation of mould and liner. The forming machine indexes the frame to the last station where an air cylinder lifts the completed liner from the frame. Prior to inspection, the liner is die trimmed and the evaporator opening cut.

The polystyrene liner walls average 0.100 in. thick. The liners are mounted in cabinet shells using spring clips on three sides and screws on the bottom. This permits the liner to "float" in the shell.

Fig. 1.—Placing the sheet in the rotary vacuum forming machine.

Fig. 2.—The top platen is lowered and a vacuum sucks the flexible polystyrene into all corners of the mould. The Admiral food liner is formed at 160 degrees, then cools for approximately one minute before moving to the next position.

Fig. 3.—Removing the finished polystyrene food liner from the vacuum form press. Moulded in the liner are two ½-in. shelf support grooves, two freezer drawer slide rails, crisper pan rail, evaporator frame and four bosses for mounting the evaporator.

Fig. 4.—Inspecting the liner after it has been trimmed. Used in the company's 9 c.ft. refrigerators and freezers, the liner measures 46½ in. high, 23½ in. wide, 20½ in. deep. It weighs 15 lb.

Cold Storage Federation's

GOLDEN JUBILEE



Above: Mr. Eugene Ruddin, C.B.E. (on right) with the guest of honour, Mr. Neville J. Foreman. Left: Mr. Ruddin, supported by Mr. Kenneth Lightfoot, O.B.E., receives the guests.

The annual luncheon of The National Federation of Cold Storage and Ice Trades, in its golden jubilee year, was held last month at The Criterion in Piccadilly, London. One hundred and fifty members and guests sat down to the repast presided over by Mr. Eugene Ruddin, C.B.E., president for the 13th year. Guest of honour was Mr. Neville J. Foreman, president of The Imported Meat Trade Association, Incorporated. Mr. Ruddin was presented with a gold watch by Mr. Kenneth Lightfoot, O.B.E., past-president, in gratitude for the service rendered the N.F.C.S.I.T.

First row, across, below: 1, James Douglas and C. M. Brain; 2, A. E. Kittle and H. Boyd; 3, R. A. Guest, A. Corazza and L. Saville. Bottom row: 1, J. Mackenzie and W. V. Smedley; 2, J. Greenwood and H. G. Jaeger; 3, W. J. Long and L. A. Gould.



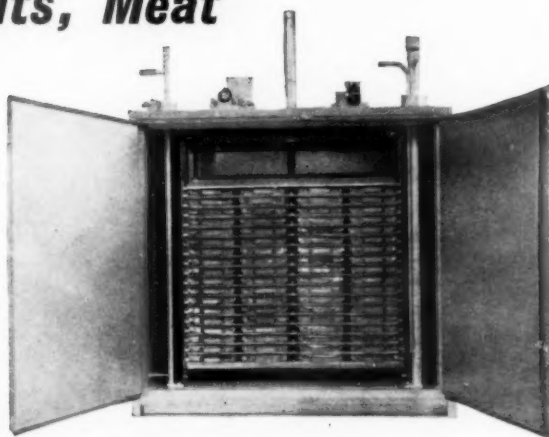


First column above, from top down: A. Ferguson, D. J. Mackners, L. A. Garrard, I. Suster and J. W. Kuypers; F. Davison, R. Finlay, G. D. Wilson, C.B.E., W. A. P. Milne, M.B.E., and K. Walker; J. P. Watkins, D. Y. Lee, and R. H. R. Lloyd. Column 2, downwards: R. G. Knight and S. Goodchild; L. E. Dendle and J. P. Watkins; R. F. A. Harbud, I. M. Rae, P. W. Jarvis and H. B. Sheasby, O.B.E.; C. Spore, V. J. Nunn and P. E. Tomlins; H. A. Bainbridge, E. W. Miller and L. B. Miller.

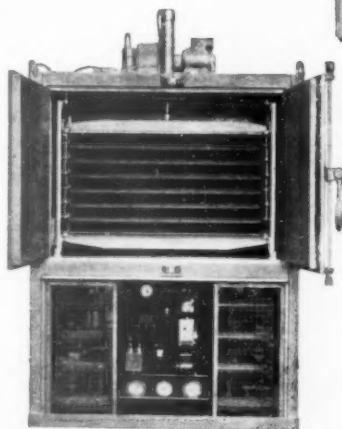
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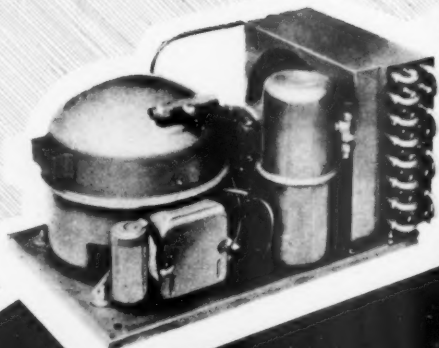
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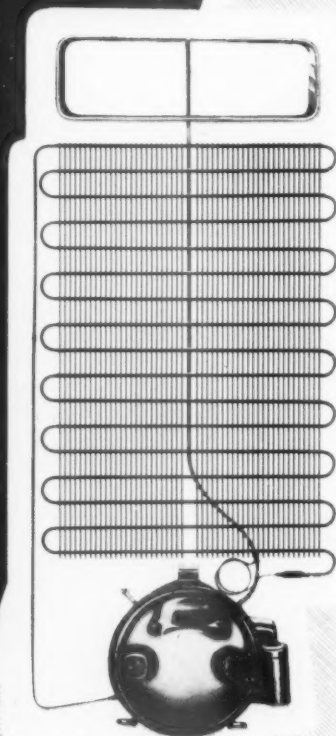


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The Institute of Refrigeration Bulletin

Institute Headquarters: New Bridge Street House, New Bridge St., London, E.C.4 (CENTral 4694).

THE SESSIONAL PROGRAMME 1961-62

The following programme has been arranged for the forthcoming session :—

October 12, 1961.—The Presidential Address by C. M. Brain, M.I.MECH.E., Member.

November 2, 1961.—“Modern Designs in Thermostatic Control for Refrigeration, including Air-Conditioning, Automatic Defrosting and Heat Pump Applications” by T. I. Syfert (A joint meeting with the Refrigeration Servicemen's Association, to be held at the National College for Heating, Ventilating, Refrigeration and Fan Engineering, commencing at 7 p.m.).

December 7, 1961.—“Developments in Storage of Fruits” by J. C. Fidler, O.B.E., B.Sc., PH.D., Member.

January 4, 1962.—“Refrigeration in Dam Cooling,” by S. I. Neuman, Associate Member.

January 31, 1962.—Annual Dinner at Grosvenor House, Park Lane, London, W.1.

February 1, 1962.—“A Review of Calorimetry Practice as Applied to Testing Refrigerating Machines,” by W. B. Gosney, B.Sc., A.C.G.I., Member.

February 14, 1962.—“Experience to Date and Commercial Developments for Refrigeration in Fishing Vessels,” by G. C. Eddie, B.Sc., Member (A joint meeting with the Grimsby Institution of Engineers and Shipbuilders, to be held at the Royal Hotel, Grimsby, commencing at 7.30 p.m.).

March 1, 1962.—“Measurement and Control of Sub-Zero Temperatures,” (A joint meeting with the Low Temperature Group of the Physical Society and the Institute of Physics).

April 5, 1962.—“The Design and Manufacture of Packaged Air-Conditioning Units,” by F. L. Pettman, Member.

Unless otherwise stated, all the above meetings will be held at the Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, London, E.C.3, at 5.30 p.m.

NOVEMBER MEETING

The meeting of the Institute to be held on Thursday, November 2nd 1961, is to be a joint meeting with the Refrigeration Servicemen's Association and will be held at the National College for Heating, Ventilating, Refrigeration and Fan Engineering, Borough Polytechnic, Borough Road, London, S.E.1, commencing at 7 p.m.; tea will be served at 6.30 p.m.

The paper to be read at the meeting is one entitled “Modern Designs in Thermostatic Control for Refrigeration, Including Air-Conditioning, Automatic Defrosting and Heat Pump Applications.” Mr. J. E. Kumler, who was to have given the paper, is now unable to make the journey from the U.S.A. and Mr. Thomas I. Syfert has kindly agreed to come over to this country from Columbus, Ohio, to give the paper.

The following is a summary of Mr. Syfert's paper:—

“During the past few years developments and improvements in the design of Domestic Refrigerators, Commercial Refrigeration applications, Reverse Cycle Air-Conditioners and Heat Pumps, have led to greater complexity of electrical control systems and a greater variety of the control components, which may be grouped under the following headings :

1. Controls for Normal Operation.
2. Defrosting Controls.
3. Protective and Auxiliary devices.

The choice of a control system depends in large measure on the design feature of the refrigeration system, the use and arrangement of the various storage spaces, but also on considerations of styling, cost and merchandising policies.

Control systems to-day are necessary to satisfy the essential requirements of automatic defrosting by either :

1. Absence of Refrigeration.
2. Electric Heat.
3. Hot Gas Circulation.
4. Reverse Cycle.

Room and window type air-conditioners are demanded which combine the function of cooling, heating and dehumidifying. The rapidly increasing interest in reverse cycle operation for heating and defrosting demonstrates the anxiety to reduce costs and increase efficiency.

The increasing acceptance of foam insulation and thin wall refrigerators requires control devices small enough for mounting in the reduced available space.

Improvements in the design of and application of the forced draught principle lead to more intense study of the air flow controls in refrigerators with two or more refrigerators.

This survey will serve to show the versatility of the already available control devices for the many and varied types of refrigeration application problems that confront us all, as well as giving indication of the forward thinking of control design engineers."

PRODUCTION ENGINEERS MEETING

The 1961 Sir Alfred Herbert Paper of the Institution of Production Engineers, "Finance for Industrial Growth," will be presented by D. L. Donne, M.A. (Executive Director, Charterhouse Industrial Development Company Limited) in the Lecture Theatre, Royal Aeronautical Society, 4 Hamilton Place, London, W.1, on Tuesday, October 17, 1961, at 6.30 p.m. (Tea will be served from 5.30 p.m.).

Mr. Donne will describe the problems of finding and providing finance for growing industrial companies and in particular the features that a city institution looks at when considering the provision of additional finance. Other sections of the paper will deal with the historical background of industrial finance; the various sources of finance; how the financial problems of growth affect the production engineer; some problems of a growing organization; and the new relationship between industry and the financial institutions. The paper will be followed by open discussion.

This meeting will be open to both members and non-members of the Institution, but admission will be by ticket only, application for which should be made to The Secretary, Institution of Production Engineers, 10 Chesterfield Street, Mayfair, London, W.1.

BRITISH STANDARD DEFINITIONS OF THE CALORIFIC VALUE OF FUELS (B.S.526 : 1961)

In the light of present-day knowledge, the definitions of the calorific value of fuels given in the 1933 edition of B.S.526 are incomplete. Industry will therefore welcome the news that this British Standard

has now been completely revised and its scope considerably extended.

In the old edition, little information was given about either the experimental determination which is the basis of all assessments of calorific value or the corrections required to obtain a calorific value for any particular thermo-chemical conditions. For gaseous fuels, no account was taken of the gross or the net value at constant volume.

The new edition, however, contains definitions of gross and net calorific value both for constant volume and for constant pressure.

Separate definitions are given for solid and liquid fuels and for gaseous fuels because the use of a specific calorimetric method is essential to the definitions for solid and liquid fuels.

The temperature 25°C., which has been accepted as the international thermo-chemical reference temperature, is recommended for the expression of calorific value instead of the temperature 60°F. adopted in the original standard. The conditions recommended for the measurements of the volume of a gas are a temperature of 60°F. (15.6°C.), a pressure of one standard atmosphere (1 atm) and complete saturation with water vapour.

The choice of 1 atm as the standard pressure for measurement of volume, together with the reference temperature 25°C., prescribed in the definition of calorific value, makes the calorific value defined in B.S.526 differ from that in the Gas Act, 1948, which must be used when any gas is subject to the requirements of the Act. However, the effect of this difference in the definitions is small.

Copies of this Standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1. Price 6s. each. (Postage will be charged extra to non-subscribers).

REFRIGERATION EDUCATION IN BRITAIN TODAY

Mr. R. W. Webb, B.Sc. (Eng.) speaking on the above subject before a meeting of Commission 9 of the International Institute of Refrigeration at the National College of Heating, Ventilating, Air-Conditioning, Refrigeration and Fan Engineering, London, last month, referred to the £1,400m. spent by the Government in the last decade on education. He added:

"The industries associated with this National College have not been completely forgotten in this huge programme and a comparatively small sum was allowed for the building of these new premises. No doubt those of you who attended the previous meeting of Commission 3, which was held in the old building in 1957, will appreciate the improvement. This achievement was by no means wholly Government sponsored, and an appeal was launched throughout the industries for help both in cash and kind. The response was remarkable and it can be taken that nearly all of the equipment throughout the building, and certainly in the laboratories, has been obtained as a result of these generous contributions."

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Literature and information are available on request.



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SHOP REFRIGERATION NEWS



"PROVISIONS" —AND WHAT THEY EMBRACE

By Our Special
Correspondent

PROVISIONS—one of the five specialized sections of the retail food trade that I listed last month—cover a wide range of products. Having made that statement, I now qualify it by explaining that the term is going out of use so far as classification of foods at retail level is concerned.

Expansion of the space given up to food retailing, and, in particular to its display, as a result of the development of the supermarkets, has brought about a greater degree of specialization. Dairy goods now come in a class on their own. Cheese, with its many varieties, ever-increasing number of brands, and of packaging styles and shapes, now requires separate presentation. To a lesser degree, the same applies to bacon now that so much of it is vacuum-packaged in brand-marked film bags.

In two different ways, this trend towards more specialized display applies to poultry. In dividing the food trade into five specialized sections (which I now think was too broad a classification) I linked poultry with fish. As a packaged product, poultry, the sale of which has increased enormously, of recent years, now calls for separate grouping. On the one hand, in the supermarkets it is often given a display cabinet to itself. On the other

hand, in individual retailing, there is now a slowly growing number of specialized shops combining the sale of barbequed and quick-frozen poultry.

So, standing as it were at the fork-roads of food retailing, sign-posted respectively "Supermarkets and Individual Shops," it can be assumed that either route leads towards more specialized presentation of the foods that come under the broad description "Provisions," as distinct from groceries, and, by

the same token to more sales of refrigerated display cabinets.

The refrigeration industry thus reaps a dual benefit from the advance of the supermarkets, because parallel with this development there has been an improvement in the general standards of food retailing.

Unfortunately there is an element of cheapjackery in supermarket trading, brought about by ruthless price-cutting combined with inferior equipment and low standards of presentation. If all supermarkets



The large expanse of refrigeration in the Fine Fare supermarket at Northampton includes a double-sided 24-ft. long island cabinet (Smithfrige-McCray for frozen foods).

SHOP REFRIGERATION

maintained the same high standards as, for example, Fine Fare Ltd., the development of this form of trading in Great Britain would do

shopping as pleasant and simple as possible, are applied to cheese, bacon, dairy goods, and other items displayed under refrigerated conditions. It is in this clear classification of the more perishable

scale version of the supermarkets of America, the self-service areas of which are surrounded by individual trading booths selling clothing, footwear, and many other kinds of merchandise. Through the joint enterprise of two individual retailers—Mr. E. Booth, a butcher, and Mr. E. Lowe, a grocer—both of whom had shops in the covered market, a shut-down cinema has been converted into a supermarket which incorporates individual shops. The two originators of the project allotted large sections of the building to their own shops, and leased the



Fig. 2.—A panorama of clearly classified and identified meat display in Fine Fare at Northampton.

Fig. 3.—Three sides of Mr. Booth's shop in The Hyde supermarket are occupied by refrigerated display cabinets. The one shown here is a 10-ft. long run for fresh meats.

nothing but good to the food industry.

In the magnificent new branch of this company at Northampton, there is a total of 36 linear feet of refrigerated display, made up as follows: 40 ft. dairy produce, 40 ft. fresh meat, 32 ft. cooked meats and bacon, and 24 ft. of quick-frozen foods. The last-mentioned is a double-sided island. The others are all wall cabinets.

All the cabinets are Smithfrige McCray models operated by Frigidaire condensing plant and installed by R. E. A. Bott (Wignore Street) Ltd.

A particularly noteworthy feature of the refrigerated displays is the impeccable arrangement of the pre-packaged fresh meat in very clearly marked classifications (by means of large signs at the back) according to the kind of cooking for which it is suited: roasting, grilling, braising, stewing, and so on.

Supplementing these signs, at a lower level just behind the displayed products, are plastic indicators identifying each group of ready-wrapped products, and assistance for the customer is carried still farther by including on every displayed item a ticket bearing its description, price, and weight.

Much the same principles of clear identification, to make



foods shown hygienically and neatly in temperature-controlled cabinets that the higher-grade supermarkets make the most serious challenge to the individual retailer.

At Hyde in Cheshire another form of supermarket has recently come into operation: a small-

remaining space to non-competing traders. Foods are sold on the ground floor and other commodities on the upper floor. Local customers can thus do all their shopping under one roof.

In addition to the butcher's and grocer's shops, there is also a con-



fectioners, a florists, fishmonger's and poulterer's shop. Owned and operated by Mr. Bill Whitworth, it has a large slab, 19 ft. long overall, the central part of which (14 ft. 6 in. long is refrigerated). Held at 32° to 34° F., this counter-type slab has a storage section beneath to which access is provided by three pairs of doors at the back: the refrigerating machinery being sited at a rear corner of the shop.

Mr. Lowe's self-service shop has a refrigerated island cabinet for the sectionalized display of the various kinds of provisions occupying a central site. This cabinet stands on short legs and has a stove-enamelled finish of wedgewood blue. Its operating machinery is housed in a compartment on the outside wall of the store.

The butcher's shop owned by Mr. Booth occupies a prominent site in the centre of the store. Here there are three different forms of refrigeration. On one side are a pair of 8-ft. Selmore cases for cooked meat: on the opposite side a 10-ft.-long Manhattan case for fresh meat, while, on the third side there is a 5-ft. long low-temperature cabinet for quick-frozen foods. In addition to these four refrigerated display cabinets, Mr. Booth has a small Frigidaire cold room that was transferred from his former premises, while in the basement there is a 600-c.ft., built-in cold room,

Fig. 5.—An enclosed case for cooked meats and a partial view of a cabinet for dairy foods and fats in a self-service shop at Frimley, Surrey.

cooled by an evaporator fitted for automatic electric defrosting. The supermarket also includes a snack-bar where ices are served from a Frigidaire roll-top display conservator. All the condensing plant for this store is mounted in an outside machine compartment. Most of the refrigerating plant and equipment in this store was supplied by F. W. Fidler and Son Ltd., Frigidaire distributors for this district.

Contrasting examples of the siting and methods of using refrigerated display in self-service store of moderate proportions are provided by Mr. K. T. Tayton's shop at 9, The Parade, Leamington, and the

SHOP REFRIGERATION

Fig. 4.—An IWO-Frys cabinet for frozen foods and a capacious Sherer model for dairy produce and cooked meats in a Leamington self-service shop.

Warren Stores (Mr. F. G. Taylor) on a new estate near Frimley, Surrey.

In the Leamington shop, which is fairly deep and relatively narrow, the two refrigerated display cabinets, installed by Stanley Refrigeration Ltd., Birmingham, are on the left-hand side within sight of the entrance. They consist of a Sherer cabinet with a large enough display area to permit of the combined, but separated, presentation of dairy produce and cooked meats, and an Iwo Frys compartmented display cabinet for quick-frozen foods—the former American, the latter Swedish. Both cabinets were supplied by M. L. Winsor & Co. Ltd.

The Frimley shop, wide, L-shaped, has three cabinets, all Leas, installed by Denver House (Sales) Ltd. of Leatherhead. Two, for dairy goods and quick-frozen foods, respectively, are along the back wall. The other cabinet, for cooked meats, a serve-over type showcase with a sloping glass front, is set slightly forward from the line of the other cabinets. In that position there is easy access for service from the back and the cabinet provides a partial screen for two doorways, one to the storeroom and the other to domestic quarters.



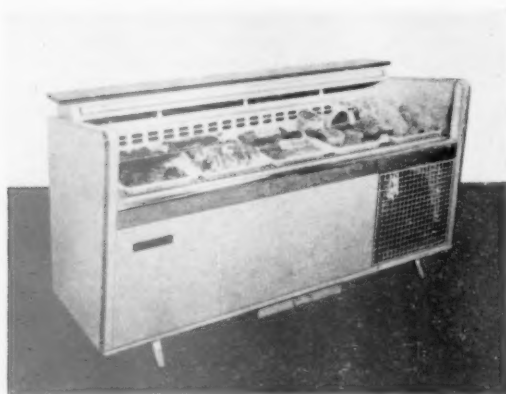
NEW FRIGIDAIRE CASES

Below: The new "Carnival" display case for fresh meat. The model illustrated is 6 ft. in length and an 8-ft. model is also available.



Mr. A. E. Hammond, specialist writer, introduces the new range.

FRIGIDAIRE'S southern distributors and members of the trade and technical press last month had a preview of a completely new series of refrigerated display cases, to be known as the "Carnival" range, introduced by Hendon. Designed primarily to suit the needs of the smaller or medium sized retail business, the new cases are in an attractive modern style and have their refrigeration mechanism self-contained in the case, so that they can be easily



moved and require only to be connected to the electricity supply on installation.

"Carnival" cases are available in three temperature ranges—for the display of provisions (38/42°F.) fresh meat (30/34°F.) and frozen foods (Zero/5°F.). Frozen food cases are supplied in 4 ft. 6 in. and 6 ft. lengths and provisions and meat cases in 6 ft. and 8 ft. lengths. Provisions and meat cases are also available with refrigerated rear storage cupboards if required.

The style of the new cases is elegant and the pro-

portions are enhanced by a graceful slope on the front and end-pieces. An impression of lightness is given by the short tapered legs which are more than just a style feature, since they allow easy cleaning under the cases. All models are available in a colour scheme of Polar white, Horizon blue or Sherwood green, with Waverite "Zig-Zag" blue or green serving shelves at the rear.

The cases themselves are entirely of metal construction, with polished stainless steel chafe rails, and upright glass fronts. The glass can either be shallow, to make self-service easy for the customer, or on meat and provisions cases it can be extended to form a high glass front, with top shelf, for self-selection with counter assistance. Heater cords are fitted to prevent condensation.

All "Carnival" cases are 3 ft. 2 in. in overall height and 2 ft. 8 in. deep, rendering delivery a simple matter even in restricted premises.

Meat and provisions cases provide 9 sq. ft. of display area in the 6 ft. length and over 12 sq. ft. in the 8 ft. length. Cooling the display area is by gravity flow or air from a rear evaporator. In addition they are provided with refrigerated rear storage cupboards of 8.2 c.ft. and 12.3 c.ft. respectively, to which access is gained through two or three doors which are securely closed by magnetic gaskets. Where refrigerated storage is not required, each case has a large "dry" storage area at the rear.

"Carnival" frozen food cases have net capacities of 8.5 c.ft. and 11.6 c.ft. respectively in the 4 ft. 6 in. and 6 ft. models. The interior of the case is of the "tank" type, cooled by a wrap-around series of evaporator tubes and by plates dividing the tank into display compartments. A false bottom shelf is available to raise the display of frozen foods, leaving a large reserve storage compartment below.

Although all "Carnival" cases are designed to be



He's locked out the heat!

He walked half a mile along the beach, in the hot sun, so that the rest of the family could have ice cream. And that takes a chap time. Both chaps and ice cream tend to melt a bit on hot days. But he took the precaution of putting his purchase in a case made from Styrocell, which is just about the best insulating material there is. Like all the rest of the clever plastics made by Shell, Styrocell has unique properties. To begin with, it's the lightest form of plastic known to man. You can saw it, shape it, nail it if you like. Styrocell is an expanded plastic and consists of thousands of enclosed pockets of still air, hence its excellent insulation properties. It is absolutely ideal for moulding applications.

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Right: Mr. G. E. Worssam, general sales manager, Frigidaire, on the right, discusses the new range.



self-contained with integral condensing units, they can also be supplied with a remotely installed unit, if preferred. In this instance the unit compartment in the case is replaced by a matching dummy compartment which is fitted with two rear storage shelves. This does not apply to the 4 ft. 6 in. frozen food case, which is designed to be installed always with an integral condensing unit.

Frigidaire introduced the new "Carnival" range at a series of exhibitions to which all members of the trade were invited. The first exhibition described above was at the Majestic Rooms, Willesden Lane, London, N.W.6 from September 20 to 22; the

second was at the showrooms of W. J. Furse & Co. Ltd., Frigidaire distributors of Traffic Street, Nottingham, from September 26 to 28; and the final exhibition was at the Houldsworth Hall, 90 Deansgate, Manchester, from October 4 to 6.



Refrigerating a Butcher's Chillroom

"Temkon" low temperature units, already popular for refrigeration of many types of store, have been installed in a butcher's shop owned by John Gardner Ltd. of Glasgow, the first time the low temperature unit has been used for this purpose in Scotland. The installation was undertaken by Watson Refrigeration Limited, who are the Glasgow agents of L. Sterne & Company Limited, Scottish sales division, the Temperature distributors for Scotland.

Two separate rooms have been refrigerated, an outer chill room and an inner frozen meat store. The chill room is maintained at a temperature of 36° to 38° F.

It has internal dimensions of 37 ft. x 12 ft. x 6 ft. high, and is insulated with 4 in. thick expanded polystyrene, finished with cement and painted blue.

The cooling duties for this chamber are handled by two "Temkon" low temperature units, with a temperature range of 25° to 38° F. As the chamber is completely underground, the only access being from a passage leading to the chill door, the coolers have been mounted on brackets entirely inside the room, as can be seen from the photograph. The "Temkon" unit is, in fact, designed so that it can be installed completely inside the store, as in this case, with its front face flush with the inside wall, or at any intermediate position, this adaptability being one of its great virtues.

Opening out of the chill room is the frozen meat store, which is used for the storage of pre-frozen beef and occasionally for $\frac{1}{2}$ cwt. of fresh meat. This room is kept at a temperature of 10° F., and measures 9 ft. x 6 ft. x 6 ft. high and is insulated with 6 in. thick polystyrene. The cooling duty of this chamber is handled by one "Temkon" low temperature unit. This unit has been mounted through the dividing

wall between the chill room and the frozen meat room. The rear of this cooler can also be seen in the photograph.

The "Temkon" low temperature units used on this installation are manufactured by Temperature Limited of London, and are completely self-contained, packaged, refrigeration units, arranged for automatic hot gas defrost. All "Temkon" plants are factory piped and wired, and therefore only require electrical supply bringing to them. The popularity of these units can be gauged from the fact that L. Sterne & Company, Scottish sales division, have fulfilled orders in Scotland for no less than 107 refrigerating units in the first six months of this year.

COMMERCIAL AND INDUSTRIAL SECTION

Manufacturers' and Distributors' News

Refrigerator Components Ltd. have moved to new and larger premises at:
6, Hardwick's Way,
Buckhold Road,
Wandsworth,
London, S.W.18.
(Telephone: VANDyke 4406 (3 lines))

COOLING TOWER CAMOUFLAGE

One of the most obtrusive features in the planning of the average factory layout is the water-cooling tower which, by reason of its size and position, frequently dominates

the surroundings and adds to the difficulties of those interested in the aesthetic planning of modern premises.

Considerable progress in reducing the size of such towers has, however, been made in recent years by Film Cooling Towers (1925) Ltd., one of the leading suppliers of this type of plant by the development of their induced draught tower incorporating their "Film Flow" packing system which produces a compact and economical unit; the ground required for such a tower for example is half to one-third of that required for a natural draught tower.

This company have now produced several new units specially designed to help the architect to give a modern treatment to this normally rather drab structure. The effect is achieved by the use of cement asbestos sheets finished in attractive contemporary and traditional designs and available in the complete British standard colour range.

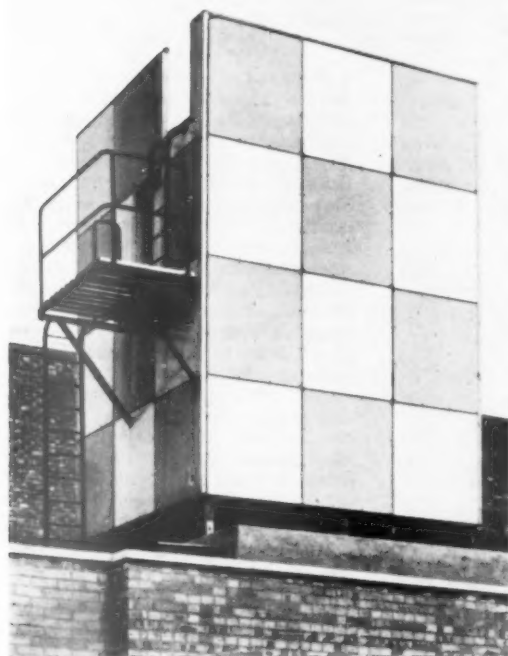
The manufacturers of the sheets claim that they have durable surfaces with coatings resistant to acidic atmospheres and to fading. Where the surrounding buildings are predominantly of concrete, corrugated and ribbed cement asbestos sheeting in self colours is recommended. The use of glazed coloured panels offers

considerable scope since it is, of course, possible to employ sheets of several colours, also sheets of varying panel sizes to achieve any particular architectural effect in harmony with the surroundings.

Mr. Robert Butler, previously a director of Quasi-Arc Ltd., has been appointed managing director of Eutectic Welding Alloys Co. Ltd. The works and welding school of this organization are situated at Feltham, Middlesex and the company is well known for its specialization in the field of repair and maintenance welding on all industrial metals. The company is part of the Eutectic / Castolin International Group which has fundamental and applied research laboratories in Switzerland and the United States of America, with factories in 15 countries, and distributors throughout the world. Before taking up his appointment, Mr. Butler visited these research centres and also saw the valuable repair and maintenance welding work being done in Europe, Canada and the United States of America.

It is announced by Copperad Ltd. that as from October 1, the name of their associate company, Manwood Miller Fans & Filters Ltd., has been changed to Copperad Air Conditioning Ltd. There will be no changes in the trading arrangements; production will continue from Stalybridge and the head office will remain at Copperad Works, Colnbrook, Bucks.

The Visco Engineering Co. Ltd., incorporated in 1921, changed its name recently to Visco Limited. This company which has been supplying, for the past 40 years, air filtration, fume removal, dust collection, water cooling and ventilating equipment to industry, will continue manufacturing these and other specialized equipment such as their recently introduced, Visco Isokinetic fume sampling apparatus (V.I.S.A.), at their factories in Stafford Road, Croydon, Surrey and Port Causeway, Bromborough, Cheshire.



Asbestos clad
cooling tower.

COMMERCIAL AND INDUSTRIAL

"Pumping" is the title of a new 12-page illustrated brochure now available from **Parkinson Cowan Measurement**, Tameside Works, Dobcross, Oldham, Lancashire. The second of a new series of three, this illustrated brochure outlines the construction of the Parkinson Cowan Measurement range of Roto-plunge pumps. This versatile pump, which has only three moving parts, has applications throughout industry. Details of these features and of specimen applications are also included. There is also an interesting section describing the Shoflo sight flow indicator, an effective device which shows at a glance whether liquid is flowing through a pipeline. The third brochure in the series, "Instrumentation," will be available shortly.

Miss Eleanor Ashburn has joined **Frigidaire Division** of General Motors Ltd., as home economist, in charge of the company's home economy section. Previously senior demonstrator for No. 4 sub-area of the North Western Electricity Board, Miss Ashburn was the 1960 winner of the Caroline Haslett Memorial Trust Travelling Exhibition, which she devoted to a comprehensive study of domestic electrical services and appliances in Germany.

Mr. Frank Simpson has been appointed director and general manager of **Kenwood Manufacturing (Australia) Pty. Limited**, a subsidiary company of The Kenwood Group. Previously production manager of the group's Woking factory, Mr. Simpson became general works manager of the Australian company in May 1959. Since that time Kenwood have built a factory in Adelaide, which is now in full production on the Kenwood Chef mixer. The appointment of Mr. Simpson in his new role is significant of future plans for expansion in Australia. In particular it is planned that the complete range of Kenwood kitchen equipment relevant to the Australian market will be manufactured in Adelaide.

A new book, "Survey of a Chemical Group," has been published by **Albright & Wilson Ltd.** It gives a comprehensive account of the character and activities of the Albright & Wilson Group of

chemical companies as it is today. The book shows how a number of companies, each with its own chronicle of success, have integrated to make the Albright & Wilson Group a rapidly expanding organization whose diverse fields of operation are world wide. Representative of a group with a forward-looking policy, the book only briefly sketches past history and concentrates on the present organization, its services and products.

After three years as senior account executive with Roles and Parker, Mr. R. H. (Bob) Hogarth has returned to industry as group publicity manager to the **Teddington Group of Companies** at Sunbury-on-Thames. No stranger to industry, Mr. Hogarth was previously with Smith's Motor Accessories Ltd., The Rubery Owen Group and Vickers Armstrong Ltd. In his new position he will be responsible for all publicity activities of Teddington Industrial Equipment Ltd., Teddington Refrigeration Controls Ltd., Teddington Autocontrols Ltd., and Teddington Controls (Export) Ltd.

A new withdrawable immersion heater has just been put on the market by **Eltron (London) Ltd.** Ceramic formers for carrying the resistance wires, which are often a source of trouble, have been dispensed with and in place of these a magnesium oxide "Eltrofin" sheathed element is fitted into a pocket. The "Eltrofin" heating element makes close contact with the pocket thus giving a much greater transfer efficiency. A much higher loading for a given length is permissible with this type of heater and the element can be withdrawn from the pocket without having to drain the tank. As this type of element is practically unbreakable it reduces maintenance to a minimum. The "Eltrofin" immersion heater for oil has a thermostat incorporated in a 2½-in. B.S.P. head.

H.P.R. Ltd. has successfully developed a new type of fan which is simple and yet combines all the essential requirements of an ideal fan. The "Mesh Fan," as it has been called, is an entirely new British invention utilizing the centrifugal effect. The construction of the mesh fan is extremely simple, and among its many features are compactness, low price, quiet operation and high efficiency. The Mesh Fan incorporates an impeller which

is formed in mesh such as "expanded metal," plastic or other material. The mesh has the usual characteristic pattern of diamond or similarly shaped openings and the narrow strands, which during the stretching operation in manufacture receive small inclination to its plane, form hundreds of small scooping blades. The mesh, whether plastic or metal, when formed into a cylinder provides a rigid yet very light centrifugal type impeller. To complete a mesh fan the runner is provided with an end plate or diaphragm and fitted on to the motor shaft. The whole assembly is then fitted into a scroll-shaped housing which will collect and direct the air as required. When the impeller rotates the air which is thrown off radially by the centrifugal force is then collected in the scroll and scooped out by the small blades. The purpose of the scroll is to convert the high velocity pressure which exists at the blade tips into a static pressure. It is for this reason that a mesh fan is capable of overcoming resistances such as filters, coils, heater elements etc. In case of ventilation, the higher outlet velocity of the mesh fan is of great importance since back draughts formed by adverse winds will be considerably reduced. Full production of fans with outputs ranging from 25-200 c.f.m. will begin early next year. However, a small 4 in. diameter fan with output of 70 c.f.m. will be on the market shortly.

Pinnock Electrical Appliances (Great Britain) Ltd., the British division of an international group of companies, with headquarters in South Australia, last month announced the launching of a range of new refrigerators on the British market. This represents the first stage in a policy of diversification in the marketing of household appliances in the United Kingdom and Western Europe by the Pinnock organization, which so far has confined itself to sewing machines in this part of the world. It is the largest sewing machine manufacturing company in the British Commonwealth. The managing director of the British company, Mr. John Pounsett, said that the introduction of the new refrigerators at this time of the year was in the nature of a pre-view for the spring and summer of 1962. By then the company would have completed plans for an intensive sales campaign and set up a network of retailers throughout the U.K. Dealers are offered 33½ per



Model displaying one of a range of four refrigerators launched recently on the British market by Pinnock Electrical Appliances (G.B.) Ltd. This is the T 500 model, of 4.6 c.ft. capacity and retailing at 55 guineas.

cent. margin. The range of models released in August comprises the T500, of 4.6 c.ft. capacity; the S600 (5.5 c.ft.); the S800 (7.5 c.ft.); and the W400, a wall type (3.75 c.ft.). Retail prices respectively are 55 gns., 65 gns., 85 gns. and 51 gns. It is understood that the refrigerators are made in Western Germany.

As part of their continued policy of expansion in the export market **Flexibox Ltd.**, Manchester, manufacturers of mechanical seals for pumps, compressors, mixers and other rotary equipment, and precision lapping machines, have announced the formation of two new subsidiaries in Italy and Australia. This follows the formation in April of a subsidiary in Holland—**Flexibox N.V.** The new Italian company—**Flexibox S.p.A.**—commenced operations on July 1. It has been formed jointly by **Flexibox Ltd.** and their present Italian agents—**Tecnologie Industriali**—and will operate from Via Mauro Macchi 27, Milan. In Australia the new subsidiary will be known as **Flexibox Pty. Ltd.** and is owned jointly by **Flexibox Ltd.** and **Harland Engineering (Australia) Pty. Ltd.**, Footscray West, Victoria. The **Flexibox** group of companies already includes **Flexibox S.A.** in Paris and **Flexibox G.m.b.H.** in Frankfurt in addition to the parent company—**Flexibox Ltd.**—in Manchester.

A new ultra-sensitive indicator alarm for moisture in gas or air is announced by **Shaw Moisture Meters**. The dial is scaled -120° to -20° C. dewpoint or in percentage relative humidity as desired. The "Shaw" hygrometer alarm contains a transistorized relay which operates alarm or control contacts according to the setting of the lower red dial pointer, which is adjusted by the thumb-screw under the dial. The indicating version of the "Shaw" hygrometer introduced some two years ago has been installed in every large English factory where semi-conductors and transistors are made, as really dry



gas and air are essential for the manufacture of many products where water vapour (even in microscopic

ally small amounts) can cause a considerable amount of trouble. This new instrument is entirely British made and uses the small capacitance type sensing elements devised by Shaw. The hygrometer alarm has a very wide application in most industries. Typical of these is the measurement of dryness of gases in metal heat treatment processes, detection of slight traces of water vapour in atomic reactors, also in the cracking plants of the petroleum industry, and in a wide variety of processes in the chemical industry. As the response to humidity changes is immediate, the instrument is suitable for giving warning of wet materials on production lines. It is used, for instance, to warn of wet straw or wood chips in wall board production, of wet wool yarn or wet fabric when being oven dried. Another remarkable feature is that the instrument works equally well when immersed in liquids containing a slight amount of water. An example of this is the measurement of water in kerosene intended for modern aeroplane jet engines. Full-scale indication on the dial is obtained when the element is immersed in paraffin containing 50 parts per 1,000,000 of water, a test which usually takes a skilled chemist some hours to carry out. The hygrometer alarm gives the result immediately.

A comprehensive manual giving data on the thermal insulation of pipework has been published by **Stillite Products Ltd.**, 15, Whitehall, London, S.W.1, a member of the Turner and Newall Group. The book is intended as a guide for those who wish to estimate heat losses and temperature gradients in insulated systems without having to sift through details of manufacturers' products. The formulae and procedure given in this publication will enable calculations to be made for most conditions provided the basic data such as thermal conductivity at the appropriate mean temperatures is known.

Duramax, now introduced by **WCB Containers**, is a new material from which all types of boxes, trays, bowls and so on can be moulded. It meets the most exacting demands for impact strength and toughness over a wide temperature range with significant loading. **Duramax** containers are virtually indestructible under the roughest handling conditions and retain or recover their

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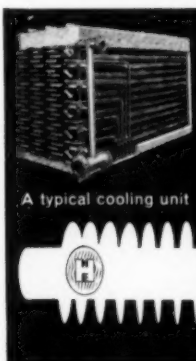
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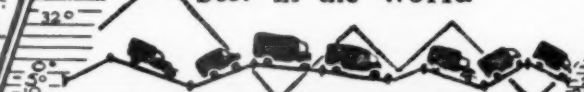
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temperatures. The photograph shown above illustrates stacking trays 24 in. by 14 in. by 6 in.; other standard sizes available are stacking trays 21 in. by 16 in. by 1½ in. and 24 in. by 18 in. by 3 in. and stacking/nesting trays 22 in. by 17½ in. by 8 in. All dimensions are internal and the depths given are effective. Additional standard styles and sizes are in course of preparation, but there would be no difficulty in designing and tooling to meet readers' specific requirements for a very modest initial outlay.

Two new welding engineers have joined **Suffolk Iron Foundry (1920) Ltd** as area technical representatives. They are Mr. H. Johnson and Mr. H. B. Travis. Mr. Johnson, who is the new technical representative for Lancashire and the north-west coast, has had 15 years welding experience as a welding engineer at Ubique Engineering Ltd. and at Hart Bros, welding engineers, both companies being in the Manchester area. He has specialized in repair and production welding. Mr. Travis, the new Yorkshire and north-east coast technical representative, has been a welding engineer for many years. This includes a period of 14 years' service with the National Coal Board, at Castleford, in Yorkshire, where he carried out maintenance welding for 16 collieries. The summer number of "Sif-Tips," published by Suffolk Foundry, is packed with informative articles well illus-

trated with valuable pictures and diagrams. One important feature is a technical article on the manufacture of refrigerators, with special reference to the major part that welding has to play in fabricating the body-work of refrigerators. The refrigerator market is a highly competitive one, and only high quality machines will hold their own in the market. This article is a comprehensive summary of the techniques involved in the welding processes, and it demonstrates the advantages of Sifbronze welding in these processes.

Designers and manufacturers of fans, ventilating and heating appliances, **Fenton Byrn and Co. Ltd.** opened their new factory at West Molesey early in May. This full-scale move—the result of more than a year of careful planning—was necessitated by rapidly increasing production schedules for markets both at home and abroad. Limited factory floor space at their old site in Surbiton, Surrey, made for congested working conditions, placed a tight rein on expansion projects and restricted the installation of machinery and equipment urgently needed to meet the constantly increasing flow of orders. Settling in at West Molesey is the climax of more than 12 years of research and development which have combined to make Fenton Byrn a leader in the field of heating and ventilating

appliances. Their sales network covers the whole of the United Kingdom and has spread to every country in the world where forced convection heaters, ventilators, exhaust fans and intake fans are part of daily living. Fenton Byrn products are designed for industrial domestic and semi-domestic use. They are essential parts of refrigeration plant, electronic computers, transformers and rectifiers; they are in demand in the aircraft industry and the production of office machinery.

With beer cooling becoming more and more popular, **Lec Refrigeration Ltd.** announce their new beer cooler, model DB 50, which is designed to chill beer as it is being drawn from the containers. This latest development is installed directly under the bar and occupies a space of only 21½ in. × 16 in. × 12 in. high. Suited mainly for "container" beers which are kept in the bar and therefore subject to fluctuating temperatures, this model lowers the temperature by approximately 10° F., and is capable of chilling between 50 and 60 pints of beer per hour as it is being drawn through the refrigeration equipment. This new model DB.50 is in addition to the already popular bottled beer cooler, model BS.72, which holds 72 half pint bottles of beer and mineral waters and is an attractive addition to any bar.



NEW MEAT DEPOT

CAP/Sansinena's new depot at Croydon. It has a capacity for frozen meat of 5,600 c.ft. at 14/16° F. The condensing unit is a Frigidaire ED8-750 with 7½ h.p. remote air-cooled condenser. The evaporator is a 4xSCF-900 (Frostmaster). The installation was made by **R. E. A. Bott Ltd.**

A review of basic heat transfer principles, an engineering comparison of direct air cooling with cooling by other fluids, an explanation of some fundamental construction alternatives, and a discussion of what can and cannot be changed in fitting the unit to the system—is contained in the original article from which this text is extracted.

AIR-COOLED CONDENSERS

—how and why they work—how to select them*

By B. L. ROBERTS

Yuba-Aimco Division, Yuba Consolidated Industries, Inc.

THE use of atmospheric air as a direct cooling medium is by no means a new concept, but its application to industrial cooling requirements has increased tremendously in the past 10 to 15 years. This has occurred principally because of the relative decrease in the supply and quality of cooling water, as the demands of civilization place a greater strain on the supply.

The atmosphere, on the other hand, offers a comparatively limitless reservoir for heat disposal, and it is natural that the reservoir be used for the dissipation of industrial heat.

Temperature Difference is Force

Heat will flow to relieve a difference in temperature just as a fluid flows to relieve a difference in pressure. Any substance may be cooled directly with dry air provided the temperature of the substance is greater than the dry-bulb temperature of the air supply.

Technology in the effective use of air as a direct cooling medium has continued to improve, so that more and more applications of heat dissipation by this means are becoming economically feasible. This applies both to industrial waste heat dissipation and to comfort air-conditioning.

What's Involved in Cooling Choice?

Therefore it is well for all concerned to understand the principles of direct air heat removal and the design and cost considerations involved.

In general, the following facts should be considered.

(1) Cooling medium cost—including the cost of water treatment that may be necessary, and the cost of obtaining water vs "free" air that is untreated.

(2) Anticipated maintenance—the possibility of dirt accumulation on the coolant side of water or air equipment which would lead to fouling and a decrease in efficiency.

(3) Expected service life—in view of the possibility of corrosive action by the cooling medium.

(4) Scheduled care—required in the normal course of operation on a regular basis, and including such things as freeze-up protection, lubrication if necessary, and inspections.

Basic equipment cost cannot be considered as the only criterion for selecting the type of system best suited for a given application. A true economic evaluation would require a complete detailed analysis of all the variables mentioned above.

In order to understand better the air-cooled condenser

as used in comfort air-conditioning and industrial cooling, it would be well to review some of the basic fundamentals of heat transfer.

How Heat is "Exchanged"

In tubular condensers, heat is transferred from the hot medium to the cold medium in accordance with the following formula:—

$$Q = UA \Delta t$$

where

Q = total heat transferred, B.t.u. per hr.

U = overall coefficient of heat transfer, B.t.u. per hr. per sq. ft. per F

A = total heat transfer surface, sq. ft.

Δt = temperature difference; the log mean temperature difference corrected for deviation from counterflow.

Let us consider each of these.

Temperature Difference

The temperature difference is actually the driving force that causes heat to flow from the hot medium to the cold. For a true counterflow exchanger, the driving force would be the logarithmic mean temperature difference existing between the two fluids. This represents a seldom-reached ideal, and consequently the value must be corrected to adjust for deviation from true counterflow. The magnitude of correction will of course depend upon the degree of deviation.

Multi-Passes, Coil Position Aid Transfer

In air-cooled refrigerant condensers, counterflow is approached by designing for the hot medium to make as many passes as possible against the air stream, and by placing the coolest refrigerant (condensate) in contact with the coolest (inlet) air. As noted in the formula, the heat load or capacity of a condenser is directly proportional to the corrected temperature difference.

Heat Transfer Surface

The heat transfer surface area, on which the heat transfer rate is based, can be any area, but for consistency is usually considered as the total outside surface area of the condenser tubing. When extended surface or fins are used, the total extended surface area is considered.

Coefficient of Heat Transfer

This is the rate at which heat will be transferred from the hot medium to the cold, and is the reciprocal of the summation of the resistances to heat transfer that exist within the system.

* By courtesy of *Heating, Piping & Air Conditioning*, August, 1961.

A simplified method for expressing the rate in terms of the individual resistances is

$$U = 1/R = 1/(r_i + r_o + r_m)$$

where

R = total resistance to heat transfer

r_i = film resistance of fluid inside tube

r_o = film resistance of fluid outside tube

r_m = resistance offered by tube metal.

The individual film resistances r_i and r_o are dependent upon the physical properties of the individual fluids, the environment temperatures and pressures, the rates of flow, and the physical characteristics of the heat transfer apparatus. Table I lists the relative resistance values normally encountered in refrigerant condensers.

Why Fins are Used

If there is a wide variation between the film resistances offered by the two fluids in use, design efficiency can be improved by the use of extended surface, or fins. The fluid which offers the highest resistance is always placed in contact with the extended surface, or in other words, with the greatest area. This tends to equalize the effective resistances, and since extended surface is usually less expensive than bare surface, the cost of the unit tends to decrease.

For this reason, almost all air-cooled condensers include high fin tubing and water-cooled units use low fin tubing. The ratio of finned surface to bare surface that should be established depends upon several factors, including the ratio of the film resistances and the heat transfer efficiency of the extended surface.

What Determines Fin Efficiency?

This efficiency factor depends upon the thermal conductivity of the fin material, the size and shape of the fin, and the heat flux or flow density. In general efficiency

TABLE I
FILM RESISTANCES TO HEAT TRANSFER FOR VARIOUS FLUIDS
ENCOUNTERED IN REFRIGERANT CONDENSERS

Fluid	Resistance range, 1/(B.t.u. per hr. sq. ft. F.)
Dry gas inside tubes	0.033 to 0.0167
Water inside tubes	0.001
Air over extended surface or fins ...	0.10 to 0.0667
Condensing refrigerant vapour ...	0.005 to 0.0025

increases with an increase in fin thickness, and decreases as the fin height (distance from the base tube) increases. A complete mathematical treatment of this subject has been published.†

Another factor in fin efficiency is the bond resistance or heat transfer resistance offered by the bond between fin and tube. Bond efficiency increases with an increase in contact area or contact pressure.

For air-cooled condensers using extended surface, the heat transfer equation should be adjusted as follows:—

$$U = 1/[r_o + (r_i \times A_o/A_i) + (r_m \times A_o/A_m)]$$

where

A_o = total outside (finned) surface area, sq. ft

A_i = inside surface area of tube, sq. ft

A_m = average or mean surface of the heat flow path through the metal tube wall.

The fin surface efficiency is normally introduced as a

correction or adjustment to r_o . One method may be shown algebraically as follows:—

$$r_o = [(r_o \times A_o) + (r_o A_i / \Omega)] / A_o$$

where

r_o = corrected air side film resistance applicable to surface A_o

r_o = actual calculated resistance of the air film

A_i = total finned surface

A_o = total bare surface exposed to air

A_o = total outside surface ($A_i + A_o$)

Ω = fin surface efficiency.

How Air-cooled Condensers Perform

In air-conditioning applications, the air-cooled condenser performs exactly the same function as would a water-cooled or evaporative unit. This function is to de-superheat and condense the refrigerant vapour on the discharge side of the compressor, or in effect to dissipate the heat absorbed by the evaporator plus the heat added to the compressor. For practical purposes, compressor heat will consist of the heat of compression plus the heat generated by friction within the compressor, and, for suction-cooled compressors, the additional heat required for cooling the motor windings.

Compression Effect on Refrigerant

In order to prevent liquid slugging of the compressor, the refrigerant should always enter the suction side in the vapour state, preferably with some degree of superheat.

TABLE II
CALCULATED VALUES FOR REFRIGERANT-22 SYSTEMS USING
TYPICAL COMPRESSORS SHOW CONDENSER HEAT EXCHANGER TO
BE ACTUALLY A DE-SUPERHEATER-CONDENSER RATHER THAN
TRUE CONDENSER

	Type of compressor			
	Open	Suction cooled	Open	Suction cooled
Saturation temperature at evaporator, ° F. ...	40	40	0	0
Saturation pressure at evaporator, p.s.i.a. ...	83.68	83.68	38.78	38.78
Compressor suction pressure, p.s.i.a. ...	82.0	82.0	37.0	37.0
Compressor suction temperature, ° F. ...	65	65	65	65
Compressor discharge pressure, p.s.i.a. ...	277.2	277.2	277.2	277.2
Condensing temperature (saturation) at compressor discharge pressure, ° F. ...	120	120	120	120
Calculated refig. vapour temperature at compressor discharge, ° F. ...	179	220	243	335

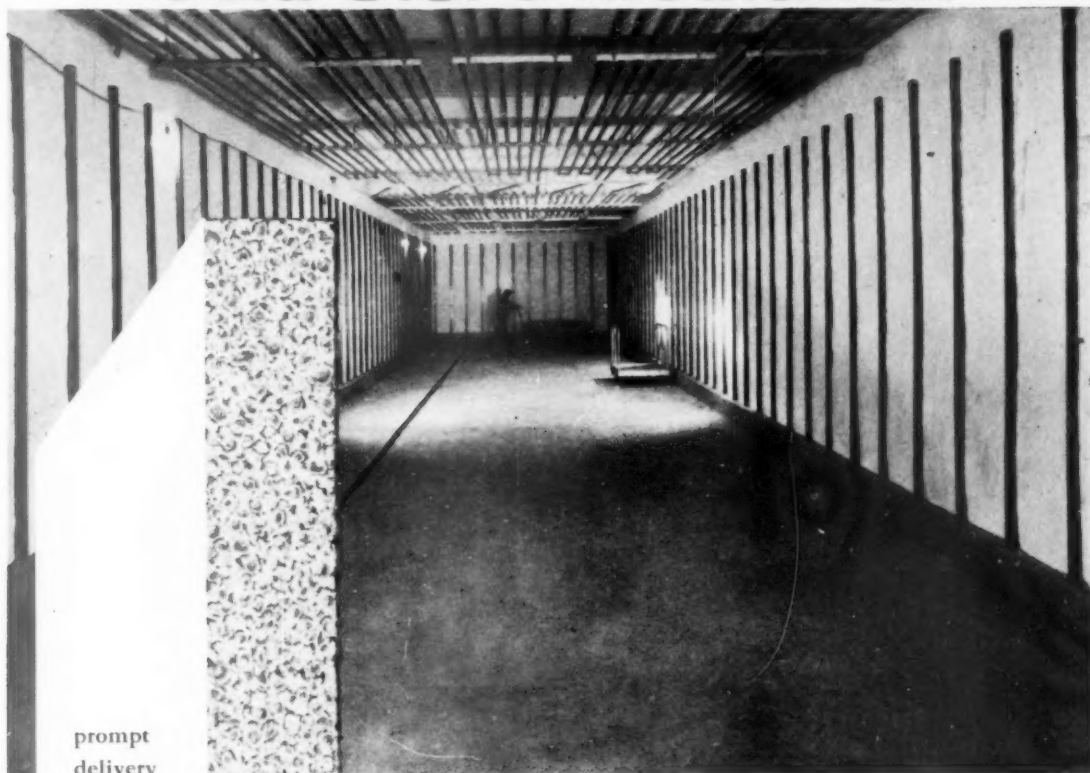
Although the action of the compressor increases the environment pressure of the refrigerant vapour and, in turn, the temperature at which the vapour will condense, the refrigerant must always leave the compressor discharge as a superheated vapour, due to the heat which is absorbed at the compressor. Table II gives calculated values of system temperature and pressure using Refrigerant-22 and compressors typical of those in common use.

From the information in table II, it is apparent that the heat exchanger is actually a de-superheater-condenser rather than a true condenser. Relatively unimportant for water-cooled units, this fact is of major significance for air-cooled condensers.

† Gardner, K. A. (1945). *Transactions, ASME*, **67**, 621-32.

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Dry Gas, Liquid Heat Transfer

The refrigerant vapour enters the condenser as a superheated dry gas, which will remain dry and which will have the dry gas heat transfer characteristic until it comes in contact with a surface (tube wall) temperature equal to the saturation temperature of the vapour at operating pressure. At this point, the surface or tube wall becomes wetted with refrigerant liquid, and subsequent de-superheating is accomplished by re-flashing of condensed liquid at the tube wall into the bulk vapour. After the tube wall is wetted, heat will be transferred at a condensing rate and at a corrected log mean temperature difference corresponding to the saturated condensing temperature.

Tube Wall Temperatures

In any condenser, the temperature of the tube wall will tend to be closer to the bulk temperature of the fluid having the lowest effective resistance to heat transfer. An analysis of the resistances shown in table I will explain why:—

(1) In a water-cooled condenser, the tube wall temperature will be closer to the bulk temperature of the water than to the bulk temperature of the refrigerant (dry gas) in the de-superheating zone, and

(2) In an air-cooled condenser, the tube wall temperature will be closer to the bulk temperature of the refrigerant (dry gas) than to the bulk temperature of the air.

In addition, cooling water temperatures are normally lower than cooling air temperatures. From this, it is obvious that the wet wall condition will be reached much earlier in the water-cooled condenser than in the air-cooled. Thus, the de-superheating zone is relatively less important with water cooling, and has less effect on the overall heat dissipating ability of the condenser.

REFRIGERATION AND MEDICINE

The eight cylinder V/W York compressor and economizer condenser installed in the surgical block at Guy's Hospital, London.



" PEOPLE AND THINGS "

" Modern Refrigeration & Air Control " is the oldest and most widely read journal in this country to-day dealing with Refrigeration and Air-Conditioning.

Because of this, our classified columns provide an effective and economical means of obtaining staff, such as engineers, draughtsmen, etc. This is also the ideal medium for selling or buying machinery, hiring specialist services such as repairs and servicing.

Why not turn to pages 1013 and 1014 and see those people who have already taken advantage of the above facts ?



New Refrigerated Vehicle

This refrigerated body, mounted on a Bedford 5-ton TK forward control chassis/cab, was recently exported to the West Coast of Africa by Sparshatts (Metal Bodies) Ltd. Similar types of bodies are being produced by Sparshatt's continuously for the home and export markets using several types of refrigeration machinery, but the vehicle shown has, of course, the Thermo King air blast, petrol or electrically operated type of cooling plant.

The body has 6 in. of polystyrene insulation and an all-welded aluminium alloy vapour-tight floor. A sun canopy is employed when the vehicles are required for export.



BULLETIN OF THE INTERNATIONAL INSTITUTE OF REFRIGERATION No. 3, 1961

Reviewed by Dr. EZER GRIFFITHS, O.B.E., F.R.S.,

Hon. Pres. of the I.I.R.

A CONGRESS of Refrigeration of Northern European countries at Helsinki in August, 1961, discussed techniques and economics of refrigeration, also research and teaching.

The *Bulletin* contains a brief account of the new laboratory set up at Brisbane, Australia, to study a variety of problems, such as freezing and dehydrating of fruits and vegetables, development of tropical food products, pure fruit juices and transport.

Referring to the abstracts, which number 240, we note the following: calibration of turbine flowmeters for cryogenic operation. It deals with the errors due to calibration in water owing to various factors such as the very low viscosity. Another abstract describes a filling plant for fluids with low boiling points.

In the group of abstracts under "Heat transmission" we note one entitled "Measurement of the conductivity of insulating materials at low temperature with a plate apparatus." The author states that free internal convection does not occur with either granulated cork or perlite; it is marked with mineral wool.

Another is entitled "Heat transfer through cold room walls with periodical variation of the outside temperature." The author describes a method in which the coefficient of diffusivity is replaced by a corrected coefficient.

Yet another has the title "General method for evaluating heat and moisture exchange in air washers during decreasing heat contents of the air." Expressions suitable for rating air washers of various types are given in the paper.

The group of abstracts relating to the "Refrigerating circuit" include the report of a lecture on the basic principles, construction and field service operation of a typical vapour compression system. Another is on "Elaboration of new tables and of a chart for refrigerant-12."

Two abstracts relate to indicators for compressors: one to strain gauges for small compressors and the second to piezo-electric indicators. "Abrasive cleaning of shell and tube heat exchangers" describes the use of abrasive sand slurry pumped through the tubes at speeds up to 18 ft. per second.

Those concerned with cooling tower design will appreciate a paper on this subject from Australia and another paper from the U.S.S.R. dealing with tests on an air cooler with porcelain Raschig rings, the results being given in the form of analytical expressions. Several abstracts deal with defrosting and 10 abstracts relate to cold rooms. To mention a few: One deals with the device to provide a blanket of air in front of a door to prevent the escape of cold storage air; another two relate to frost heave and three to automatic or semi-automatic operation.

There is an account of a 4,000-ton store opening at -20°F . at Liverpool.

The importance of air-conditioning technique is illustrated by the printing of 36 abstracts on this subject five of which relate to printing works. There is a lengthy abstract entitled "Aerospace industry—new horizons for air-conditioning design."

The heat pump is the subject of a comprehensive study and a thermodynamic discussion in a series of papers from Australia. It states that the performance of the actual pump is usually 40 per cent. under the ideal value predicted from the Carnot cycle.

A study of the bacteriology of crushed trawler ice showed that whilst there were comparatively few bacteria in newly-crushed ice prior to loading abroad trawlers after a fishing trip of about five days, unused ice can be regarded as large carriers especially if fish fragments are visible.

Refrigerated transport embraces many abstracts which include "Temperature in frozen fish shipped by road in refrigerated trailers" and "Tests on Linde's liquid nitrogen system for trucks."

Dealing with the gas liquefying industry we note an abstract on transferring liquefied gases by pipe line over long distances.

Claims for ozone in the operation of cold stores include the retardation of the growth of moulds and permitting operation in a more humid atmosphere resulting in a reduction of shrinkage.

A report of a conference on frozen food quality contains 12 abstracts of the papers contributed.

An abstract entitled "Freeze-drying" reviews the techniques in this field.

A lengthy contribution is entitled "Physiological effects of refrigeration and commercial quality in the special case of fruit."

Under fish we note the report of a U.S. delegation on Russia's Far Eastern fisheries activities. Antibiotics in fish preservation are considered in another abstract.

Quick thaw for frozen fish by dielectric heating is dealt with. Physical and chemical properties of shrimp drip as indices of quality are discussed in this edition.

The author of a paper on "Statistical quality control of frozen meat and fruit pies" claims for his method sufficient accuracy and simplicity that even the smallest processor can apply it.

The *Bulletin* contains a full report of recommendations relating to testing methods for insulated, refrigerated, mechanically refrigerated and heated transport equipment, prepared by a working party of Commissions 2 and 7 for the Economic Commission for Europe. It occupies eight pages of the *Bulletin*.

Among the books received at the Institute's Library we note the following: "Proceedings of an International Conference on Dairy Questions" (French); "The Nutrient and Therapeutic Value of Fruit and Vegetables" (English); "Proceedings of the First Congress of Air-Conditioning" (Italian); "Soviet Refrigeration Technology. A Bibliographic Handbook" (English).

A number of reviews are given of U.S.S.R. government publications of books for trade requirement.

A book in French is entitled "Year-Book of Refrigeration and Air-Conditioning," 15th issue. It is a comprehensive volume of 862 pages.

THERAPEUTIC SWEATING The Use of Refrigeration for Heat Balance in Man

DR. E. F. St. John Lyburn, whose work has been described in these columns in the past, has, over a period of a year at the age of 56, removed from his body on the average 6 lb. of sweat per diem under wet heat in equipment in which refrigeration is used to maintain thermal balance.

This was done in perfect balance as many subjects can remain 8 to 12 hours under such conditions with interrupted periods for food and relaxation.

His weight on August 1, 1960, was 14 stone 10 lb. 8 oz., and on August 5, 1961, 14 stone 7 lb. 2 oz. During this period approximately 2,108 lb. of sweat was removed—not far short of a ton (except for 132 lb.).

Taking the average composition of sweat, i.e. the mean between the lowest and the highest concentrations found

in sweat per 100 ml. the following amounts were removed from his body over 12 months of sweat.

		Mg. per 100 ml. average	Sweat approx. lb. oz.
Urea	1,264.8	100	2½
Ethereal fat ...	3,794.4	300	8
Cholesterol ...	25.29	2	0 ¾
Lactic acid ...	1,391.2	110	3
Glucose	5,051	40	1 1
Ammonia nitrogen...	379.4	35	13
Non-protein nitrogen	505.1	40	1 1
Potassium	379	30	13
N.A. sodium ...	1,180	70	2½
Sodium chloride ...	3,027	350	6
Total			26 0½

The results of this must point to the following conditions :—

1. Sweating does not remove weight if the normal body is in health.
2. Sweating under these conditions can complement excretory by-products of the liver and kidney.
3. Many other solutes are also excreted such as :—
Calcium Magnesium Phosphate Sulphate
Crestine Crestinine Oxalix acid Mucine
Ketosteroids Pregnanadiol Uric acid,
as well as alkaline and acid phosphates.
4. The removal at this age from the subject's body of the above quantities of metabolites must prevent early degradation of cells.
5. It is an accepted fact that in the process of ageing degeneration occurs in both the liver and kidney cells, and from the above facts any factor that can supplement physiological excretion, and keep the environment of the cells in proper homeostatic balance must be essential to the treatment of all systemic disease. At the same time it has been found that the prothrombin times are increased under this routine sweating, and the oxygen saturation of the superficial venous blood can rise to arterial saturation.

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The New Scientist (1957), 3, 6377.
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Hospital Equipment News (1961), 7, No. 73.

PATENTS

August 1—Pye Ltd. Elvy, M. T., P27925, Thawing frozen foods. 3—Mitchell Engineering Ltd., Mason P. B., Palframan, J. A., and Woodward, E. A., P28309, Freeze-drying. 9—British Syphon Co. Ltd., Harris F. E., P28773, Beverage refrigerating and dispensing apparatus. 11—Porter & Co. (Salford) Ltd. T., Porter, T., P29010, Cooling of liquids; Worthington Corporation, C29034, Multiple compressor systems for refrigeration installations. 16—Lec Refrigeration Co., Ltd. and Turnbull, E. J., P29495, Refrigeration door hinging; Watkins, C. J., P29610, Refrigerators etc. 17—

Briggs, G. A., P29755, Refrigerators; Imperial Chemical Industries Ltd. Greer, K. R., P29717, Water cooling towers. 19—Plastickade (Manchester) Ltd. Zienba, W., and Zylko, Y., P29989, Insulating material. 21—American Radiator & Standard Sanitary Corporation, C30067, Refrigeration machine. 22—Curry, R. S., P30286, Chilling or cooling of liquids. 23—Cascade Frozen Foods Inc. C30472, Apparatus for loading articles into boxes.

COMPLETE SPECIFICATIONS ACCEPTED

August 23—Specialties Development Corporation, 879,393, Control network for air-conditioning units; General Motors Corporation, 879,633, Ice-block release apparatus; Whirlpool Corporation, 879,634, Ice-making machines; Couch International Methane Ltd., 879,809, Refrigeration system. 30—Porter & Co. (Salford) Ltd., T. 880,093, Heat pumps. September 6—Gordon Johnson Equipment Co., 880,876, Apparatus and method of freezing food products; Alfa-Laval Co., Ltd., 880,638, Milk cooling apparatus; Svenska Flaktfabriken, A. B., 880,536, Room unit for air-conditioning; General Motors Corporation, 880,675, Household refrigerators; National Cash Register Co., 880,859, Method for indicating temperature variations in a refrigerating apparatus. 13—De Havilland Aircraft Co., Ltd. 881,180, Liquid refrigerant pump system.

New Companies

The accompanying particulars of New Companies recently registered are taken from the Daily Register compiled by Messrs. Jordan and Sons Ltd.

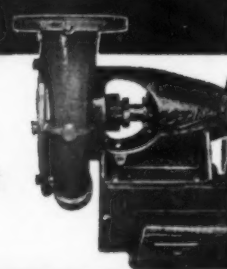
Canair Ltd., 17, Fleet Street, E.C.4. Secretary: Doris M. Winckler. To carry on the business of dealers in heating, ventilating and air-conditioning equipment, etc. Nominal capital: £10,000. Directors: Cecil M. Marks, Riverbank Cottage, Laleham-on-Thames; Paterson Cowan, 12, Church Street, Windsor; John E. Marks and Wilfred Smith.

Trent Valley Refrigeration Ltd., 30, Willoughby Street, Nottingham. Secretary: K. H. Trolley. To carry on the business of manufacturers of and dealers in refrigerators, etc. Nominal capital: £5,000. Directors: Kenneth H. Trolley, 69, Hallam Fields Road, Ilkeston; Frederick R. Haywood, 310, Wollaton Vale, Nottingham.

Polarison Cold Rooms Ltd., 37, St. James' Gardens, Wembley. Secretary: K. W. Archer. To carry on the business of manufacturers of and dealers in cold rooms refrigerators, etc. Nominal capital: £1,000. Directors: Albert Pujasa, 6 Federal Road, Perivale, Greenford; Kenneth W. Archer, 3, Atterbury Road, N.4.

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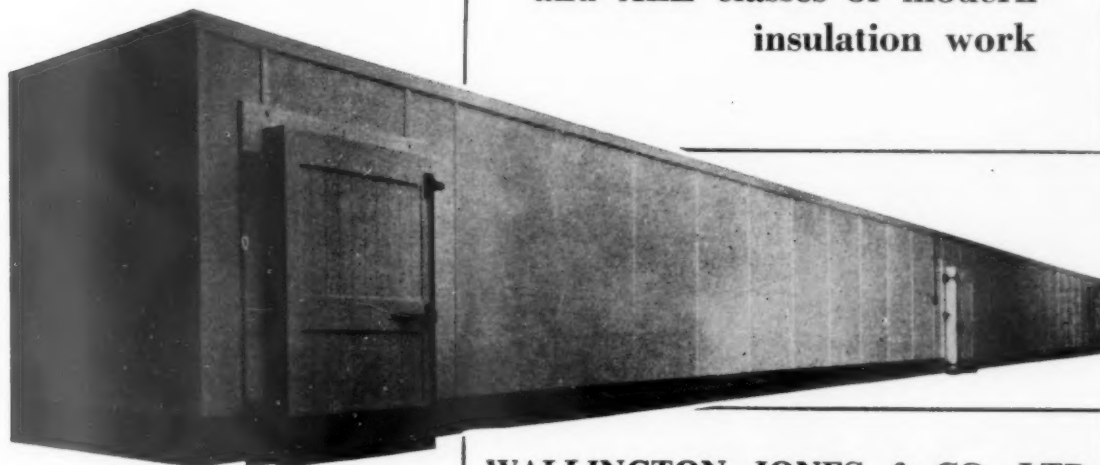
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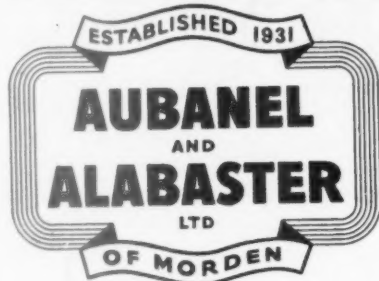
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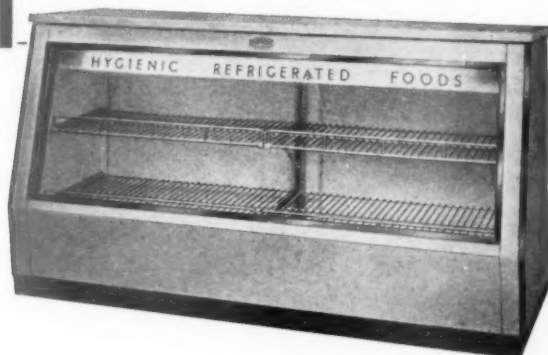
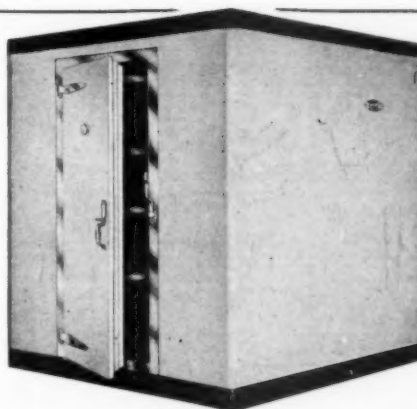
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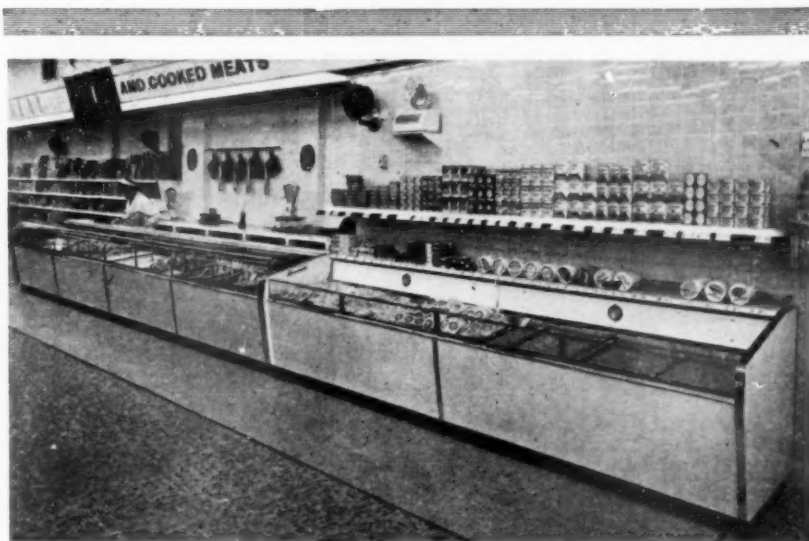
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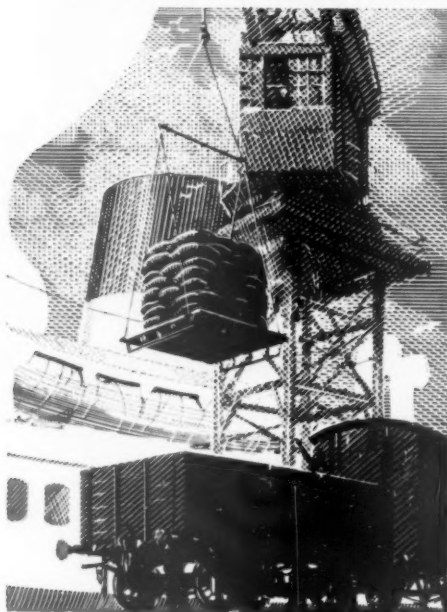
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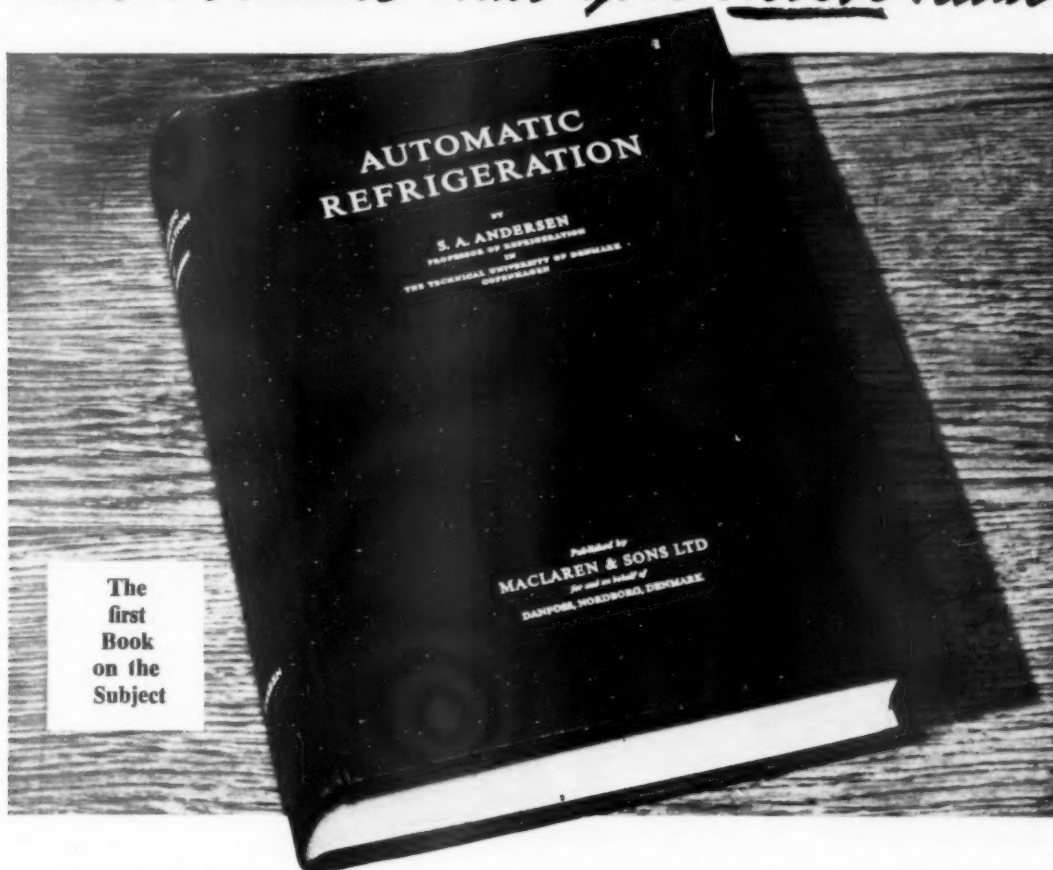
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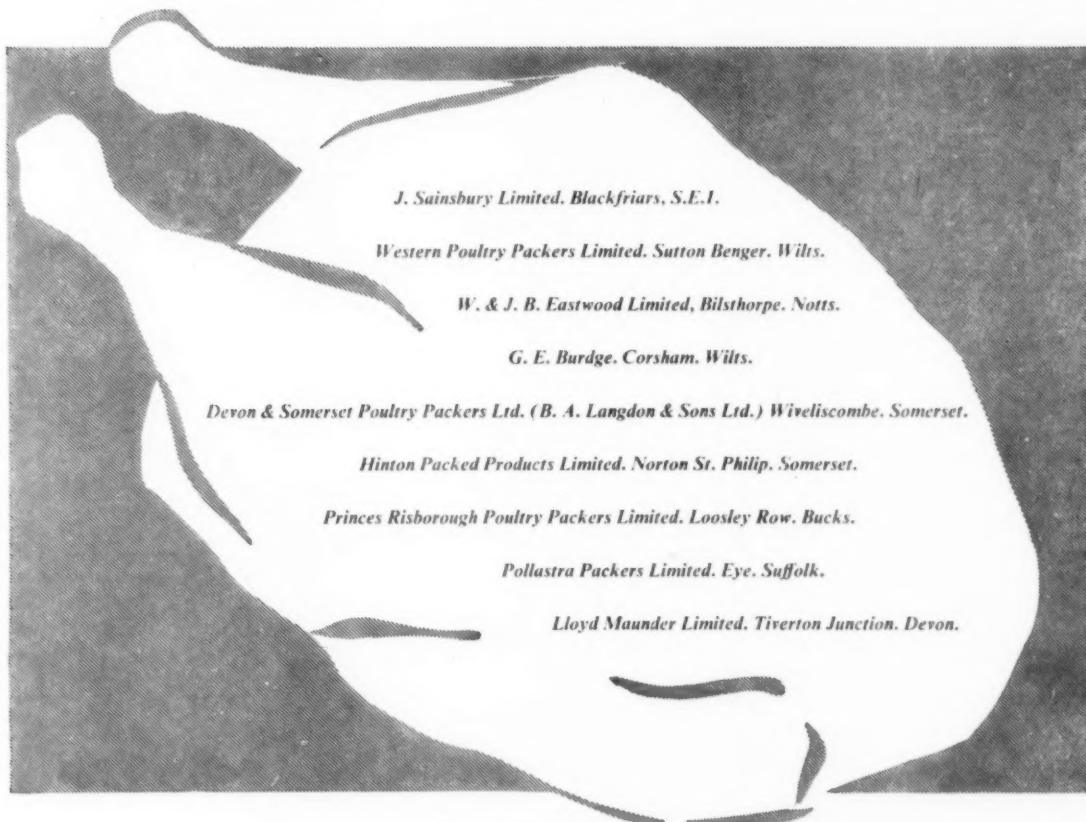
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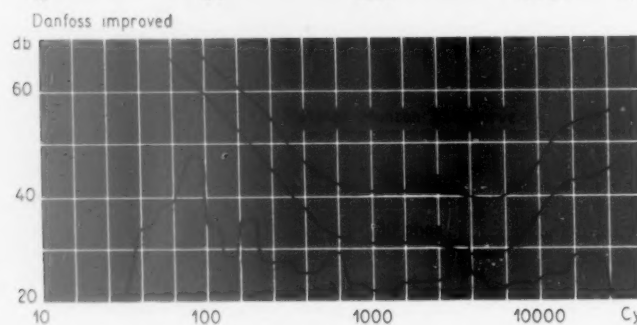
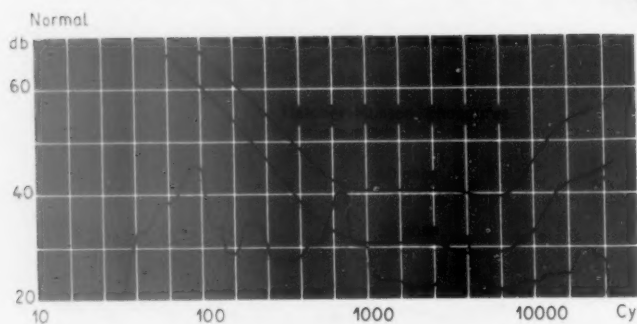
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